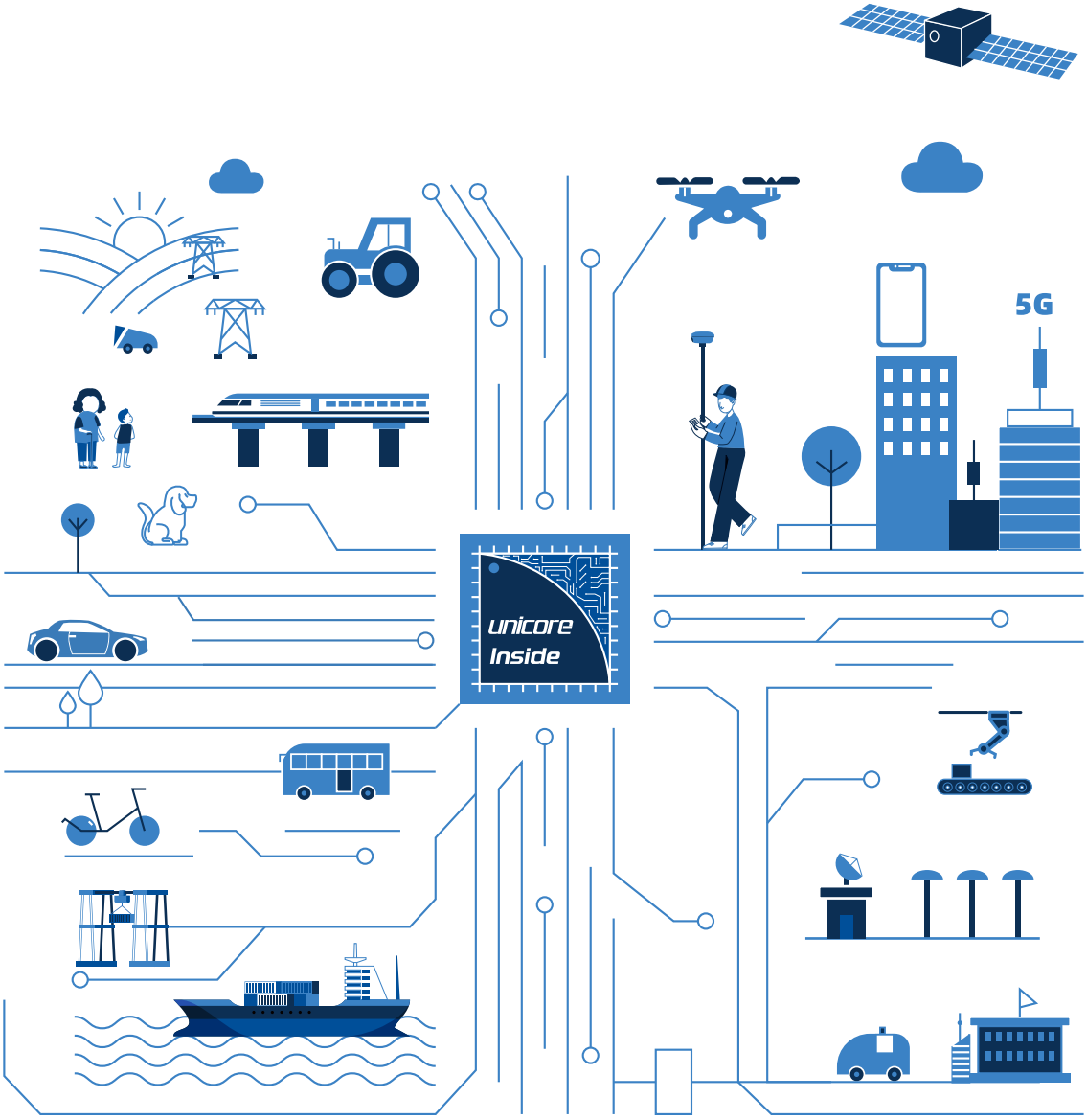
PRODUCT BROCHURE

unicore
a BDStar company

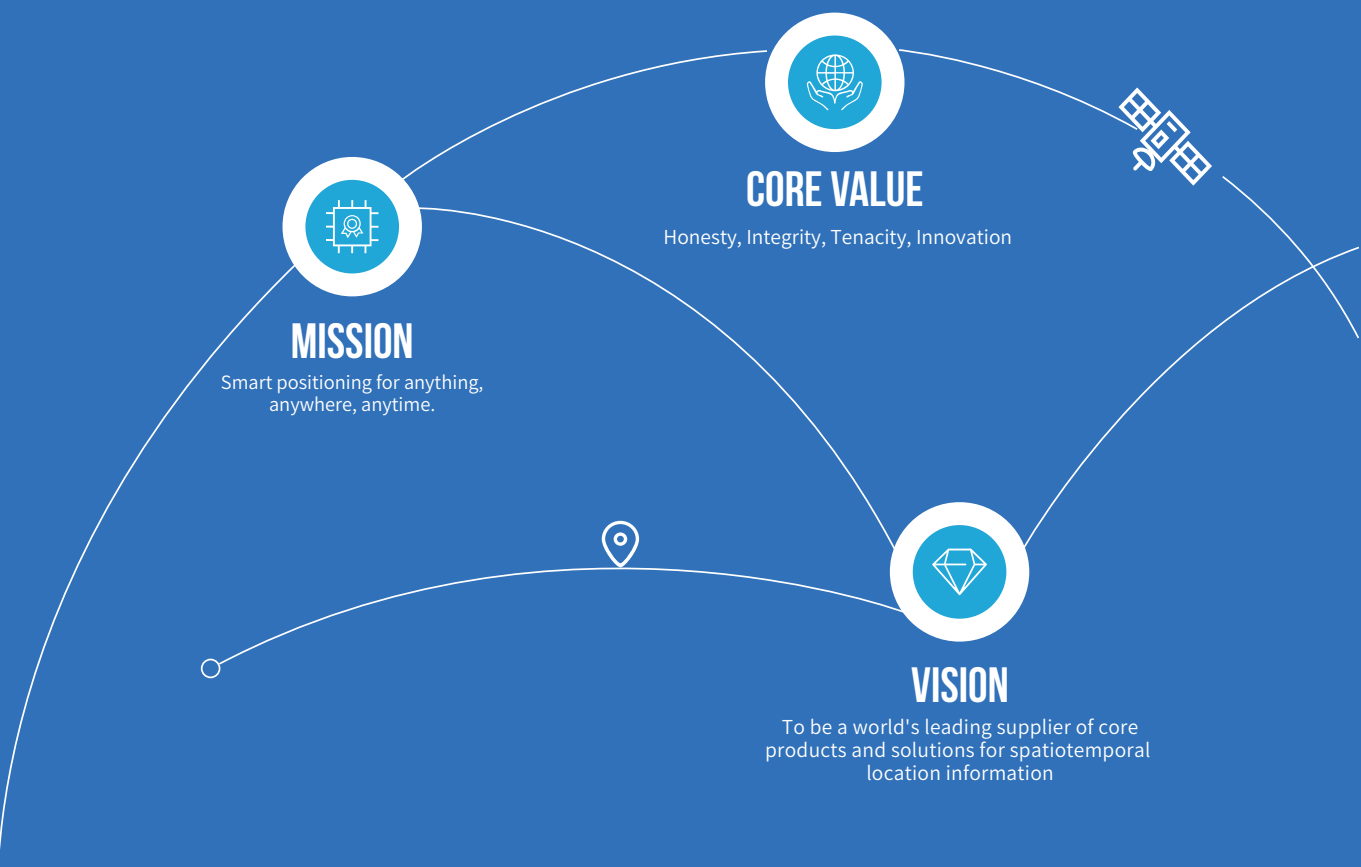


UNICORE

Unicore Communications, Inc. is a high-tech company dedicated to high performance satellite navigation and positioning, multi-sensor fusion algorithm development, and highly integrated GNSS IC design.

The accuracy of Unicore GNSS receivers covers every level from meter and sub-meter to centimeter and millimeter precision.

Using in-house designed proprietary technology, Unicore has successfully developed a series of multi-constellation, multi-frequency, high-performance GNSS receivers for applications ranging from industrial market, automotive market to consumer and IoT market.



CONTENTS

TECHNOLOGY ADVANTAGES

SMART
POSITIONING FOR
ANYTHING ANYWHERE
ANYTIME

U-GNSS Multi-system Fusion Algorithm

Based on the "multi-system fusion" concept, Unicore has developed its unique U-GNSS algorithm and GNSS SoC compatible with GPS, BDS, GLONASS, Galileo, and QZSS, providing more flexible and diversified solutions for users. U-GNSS multi-system fusion algorithm integrates the reception and processing of multiple GNSS signals on a single chip, supporting multi-constellation multi-frequency signal input and corresponding baseband processing function, which is in line with the development trend of GNSS.

RTK Technology

Unicore's new generation of RTK processing technology utilizes satellite signals from GPS, BDS, GLONASS, Galileo and QZSS. It makes full use of Nebulas SoC's high-performance data sharing ability and ultra-simplified operating system to optimize multi-dimensional RTK matrix calculation. This greatly improves RTK processing ability by more than 80%, and realizes all-constellation all-frequency positioning calculation of over 65 satellites.

Ultra Low Latency Processing Technology

With simplified real-time operating system and high-efficiency full-sync time-wheel scheduling technology, the ultra low latency processing technology enables more than 100Hz RTK processing and reduces the output delay to less than 10ms. The on-board GNSS+INS integrated navigation system provides up to 200Hz attitude and positioning data. The ultra low latency processing technology meets the need of autonomous driving and UAVs that require ultra-low latency under harsh conditions.

DUAL-RTK

DUAL-RTK Solution enables the single-board dual-antenna positioning and heading receiver to realize dual-RTK calculation. The primary antenna involves in the high-performance RTK positioning calculation, while the secondary antenna also receives satellite signals and performs high-precision RTK solution. This is particularly helpful in actual road and farmland operation where the primary antenna is blocked and unable to provide RTK positioning result; if the secondary antenna can still track satellites, DUAL-RTK Solution will provide the RTK positioning results of the secondary antenna.

INSTANT HEADING

INSTANT HEADING uses the synchronized, symmetric, and multi-path mitigated observation data provided by Unicore single-board dual-antenna products, and uses the multi-mode, multi-frequency, wide-lane and narrow-lane combined ambiguity searching algorithm, cycle slip detection and repair algorithm, multi-path error model algorithm, to realize single epoch ambiguity fix, which greatly improves the calculation time and reliability. Unicore dual-antenna products support GPS, BDS, GLONASS, Galileo, and QZSS, which improves the usability and precision of INSTANT HEADING. INSTANT HEADING is deeply combined with on-board INS, maintaining high-precision heading function for a long time even if the satellite signals are blocked, which further improves the usability of the heading function.

RTKKEEP

After the base station data is interrupted, the RTK positioning accuracy drops rapidly, and generally cannot provide centimeter-level positioning accuracy after 20 seconds. Unicore's RTK KEEP technology can eliminate the positioning errors affected by satellite orbits, clock bias, ionosphere and troposphere delay by means of models and parameter estimation after the base station data is interrupted, and centimeter-level positioning accuracy can be maintained for more than 10 minutes. This greatly improves the usability of RTK, especially for UAVs, forestry operations, and other applications where radio or wireless network communication is often interfered or blocked.

Anti-Jamming Technology

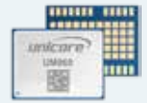
As the time-domain jamming detection has a certain delay and the jamming-to-signal ratio (JSR) is poor, while the frequency-domain jamming detection and suppression have a high power consumption, frequency-domain or time-domain anti-jamming alone fails to meet the requirement of customers, which limits the application of high-precision modules. Unicore's frequency-domain and time-domain joint anti-jamming technology combines wideband and narrowband configuration to achieve a perfect balance between the anti-jamming function and low power consumption.

URAIM

With the development of navigation systems, the number of available satellites has increased to more than 50, which makes the workload of the RAIM algorithm grow exponentially, and requires higher efficiency for the RAIM algorithm. URAIM is an adaptive intelligent error detection algorithm, which significantly reduces the probability of false and missed alarms in traditional RAIM algorithms. It can quickly detect abnormal satellites no matter in an open sky environment where satellites are sufficient or in a harsh environment where satellites are few, ensuring the effectiveness and reliability of positioning.

PRODUCTS

UNICORE NEBULASIV SERIES PRODUCTS

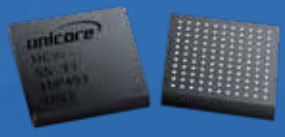
	 **UB9A0** All-constellation GNSS High-Precision Board	 **UM980** GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency High-Precision RTK Positioning Module	 **UM982** GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency High-Precision Positioning and Heading Module	 **UM981/UM981S** GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency RTK/INS Integrated Positioning Module	 **UM960** GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency High-Precision RTK Positioning Module	 **UT986** GNSS All-constellation Multi-frequency High Accuracy Timing Module
Quality Certificates	RoHS, REACH, CE, FCC, IC, RED	RoHS, REACH, CE, FCC, IC, RED	RoHS, REACH, CE, FCC, IC, RED	RoHS, REACH, CE, FCC, IC, RED	RoHS, REACH, CE, FCC, IC, RED, POPs, TSCA	RoHS, REACH, RED
Application Areas	CORS; GBAS; High-precision Surveying and Mapping	Surveying and Mapping; Precision Agriculture	UAV; Precision Agriculture; Autonomous Machine	Surveying and Mapping; Precision Agriculture	Robotic Lawn Mower; Robots; Drone Light Show; GIS Handheld	Telecom Base Station Timing; Electrical Power Grid Timing; Network Time Synchronization
Dimensions, Packaging and Weight	60 × 100 × 11.4 mm 40 pin 46.5 ± 2.5 g	17.0 × 22.0 × 2.6 mm 54 pin LGA 1.88 ± 0.03 g	16.0 × 21.0 × 2.6 mm 48 pin LGA 1.82 ± 0.03 g	17.0 × 22.0 × 2.6 mm 54 pin LGA 1.91 ± 0.03 g	12.2 × 16.0 × 2.6 mm 24 pin LGA 1.11 ± 0.03 g	17.0 × 22.4 × 2.4 mm 28 pin LCC 1.9 g
Single Point (RMS)	Hor: 1.5 m Ver: 2.5 m	Hor: 1.5 m Ver: 2.5 m	Hor: 1.5 m Ver: 2.5 m	Hor: 1.5 m Ver: 2.5 m	Hor: 1.5 m Ver: 2.5 m	Hor: 1.5 m Ver: 2.5 m
DGPS (RMS)	Hor: 0.4 m + 1 ppm Ver: 0.8 m	Hor: 0.4 m Ver: 0.8 m	Hor: 0.4 m Ver: 0.8 m	Hor: 0.4 m Ver: 0.8 m	Hor: 0.4 m Ver: 0.8 m	—
RTK (RMS)	Hor: 0.8 cm+1 ppm Ver:1.5 cm+1 ppm	Hor: 0.8 cm + 1 ppm Ver: 1.5 cm + 1 ppm	Hor: 0.8 cm + 1 ppm Ver: 1.5 cm + 1 ppm	Hor: 0.8 cm + 1 ppm Ver: 1.5 cm + 1ppm	Hor: 0.8 cm + 1 ppm Ver: 1.5 cm + 1 ppm	—
Heading (RMS)	—	—	0.1° /1 m baseline	—	—	—
Frequency	GPS L1C/A, L1C, L2C, L2P(Y), L5 BDS B1I, B2I, B3I, B1C, B2a, B2b GLONASS G1, G2, G3 Galileo E1, E5a, E5b, E6 QZSS L1C/A, L1C, L2C, L5, L6 NavIC L5 SBAS L1C/A L-Band*	GPS L1C/A, L1C, L2C, L2P(Y), L5 BDS B1I, B2I, B3I, B1C, B2a, B2b GLONASS G1, G2, G3 Galileo E1, E5a, E5b, E6 QZSS L1C/A, L1C, L2C, L5, L6 NavIC L5 SBAS L1C/A L-Band*	GPS L1C/A, L2C, L2P(Y), L5 BDS B1I, B2I, B3I,B1C*,B2b* GLONASS G1, G2 Galileo E1, E5a, E5b,E6* QZSS L1C/A, L2C, L5, L6* SBAS L1C/A	GPS L1C/A, L1C, L2C, L2P(Y), L5 BDS B1I, B2I, B3I, B1C, B2a, B2b GLONASS G1, G2, G3 Galileo E1, E5a, E5b, E6 QZSS L1C/A, L1C, L2C, L5, L6 NavIC L5 SBAS L1C/A	GPS L1C/A, L2C, L2P, L5 BDS B1I, B2I, B3I, B1C, B2a, B2b* GLONASS G1, G2 Galileo E1, E5a, E5b, E6* QZSS L1C/A, L2C, L5 SBAS L1C/A	GPS L1C/A, L2C, L5 BDS B1I, B1C, B2a GLONASS G1 Galileo E1, E5a, E5b QZSS L1C/A, L2C, L5
IMU	—	—	—	●	—	—
Dual Antenna	—	—	●	—	—	—
RTK/Initialization Time (s)	< 5	< 5	< 5	< 5	< 5	—
Cold Start (s)	< 12	< 12	< 30	< 12	< 30	< 30
Data Update Rate (Hz)	50	50	20	50*	20	1
Output Latency (ms)	< 25	< 25	< 20	< 10	< 20	< 20
Interface — **Serial Port**	1 x RS-232 2 x LVTTL	3 x LVTTL	3 x LVTTL	2 x LVTTL (UM981) 3 x LVTTL (UM981S)	3 x LVTTL	2 x LVTTL
Interface — **Ethernet Port (10/20 M)**	1	—	—	—	—	—
Interface — **1PPS**	1	1	1	1	1	1
Interface — **External Clock**	1	—	—	—	—	1
Page	14	10	9	12	11	13

● Support; -N/A; * Optional

NebulasIV
UC9810

All-constellation

All-frequency RF Baseband and High-precision Algorithm Integrated GNSS SoC



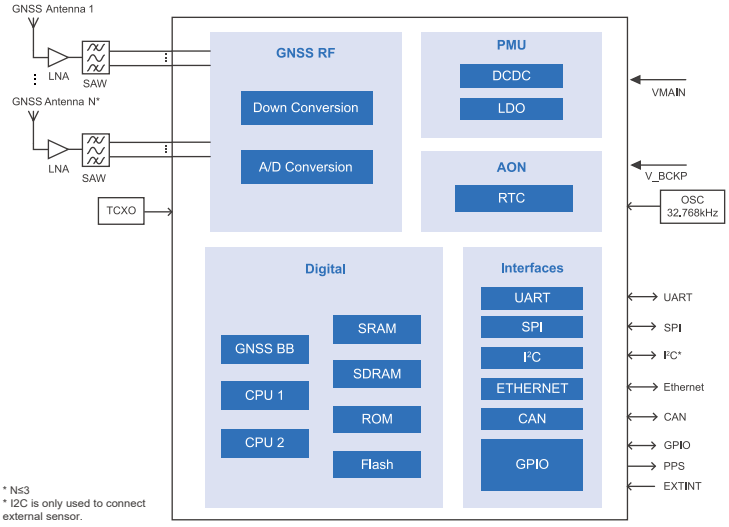
NebulasIV UC9810 is Unicore's new generation proprietary GNSS SoC that integrates RF, baseband, and high-precision algorithm. By leveraging advanced process node architecture, high-performance multi-mode baseband GNSS processor and embedded microprocessor, the chip delivers superb performance and maintains low power consumption. UC9810 supports 1408 channels and tracks multiple signals, including GPS, BDS, GLONASS, Galileo, QZSS, NavIC, SBAS, and L-band. The integrated RTK matrix processing technology allows the chip to deliver an enhanced all-constellation all-frequency centimeter-level RTK positioning and heading.

NebulasIV features high integration, high performance, low power consumption and compact form factor. It is an ideal solution for technically demanding high-precision applications, such as drones, robotic lawn mowers, precision agriculture, surveying and mapping, intelligent driving and timing.

NebulasIV supports various external interfaces that cover almost all the common application interfaces, including RTC power supply, PPS, EVENT, CAN, network,UART, SPI, I2C, odometer, configurable GPIOs, etc.

Applications

- UAV
- Surveying and Mapping
- Robot
- Telecom Timing
- Deformation Monitoring
- Autonomous Driving
- Precision Agriculture



* Ns3
* I2C is only used to connect external sensor.

Key Technologies

- Dual-processor primary-secondary asynchronous architecture
- Dedicated RTK matrix processor
- UPF low-power technology
- All-constellation and all-frequency joint acquisition and tracking algorithm
- Anti-jamming capability (JamShield)
- RTKKEEP technology

Features

- All-constellation all-frequency RF, baseband and high-precision algorithm integrated GNSS SoC
- Completely independent intellectual property right
- Supports GPS L1C/A, L1C, L2C, L2P(Y), L5; BDS B1I, B2I, B3I, B1C, B2a, B2b; GLONASS G1, G2, G3; Galileo E1, E5a, E5b, E6; QZSS L1, L2, L5; NavIC L5; SBAS; L-band
- Ultra-small size of 7 × 7 mm with a minimum PCB layout area of only 12×16 mm
- Ultra-low power consumption of 300mW
- 1408 channels and up to 100 Hz data update rate
- All-constellation all-frequency on-chip RTK positioning and dual-antenna heading solution

Performance

Channel	1408 channels
Frequency	GPS L1C/A, L1C, L2C, L2P(Y), L5
	BDS B1I, B2I, B3I, B1C, B2a, B2b
	GLONASS G1, G2, G3
	Galileo E1, E5a, E5b, E6
	QZSS L1, L2, L5
	NavIC L5
	SBAS
	L-band
Dimensions	7 × 7 mm
Cold Start	< 12 s
RTK Initialization Time	< 5 s
Single Point Positioning (RMS)	Horizontal: 1.5 m
	Vertical: 2.5 m
DGPS (RMS)	Horizontal: 0.4 m
	Vertical: 0.8 m
RTK (RMS)	Horizontal: 0.8 cm + 1 ppm
	Vertical: 1.5 cm + 1 ppm
Initialization Reliability	> 99.9%
Differential Data	RTCM V3.X
Data Update Rate	100 Hz
Timing Accuracy	2.5 ns (1σ)
Power Consumption	300 mW (single antenna)
Heading Accuracy	0.1°/1 m baseline

UM982

GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency High-precision Positioning and Heading Module

16.0 × 21.0 × 2.6 mm

Features

- Based on Unicore's proprietary GNSS SoC NebulasIV that integrates RF, baseband and high-precision algorithm
- Supports all-constellation multi-frequency on-chip RTK positioning and dual-antenna heading solution
- Dual-RTK technology
- 60 dB narrowband anti-jamming and jamming detection
- Adaptive recognition of RTCM format differential data
- STANDALONE single-station high-precision positioning technology
- Supports B2b-PPP, E6-HAS and QZSS L6E (MADOCA) PPP

Applications

- UAV
- Autonomous Machine
- Precision Agriculture

UM982 is Unicore's new-generation proprietary high-precision positioning and heading module. Its primary and secondary antennas can simultaneously track multiple frequencies of all GNSS systems, and the module can perform on-chip RTK positioning and dual-antenna heading calculation. The built-in advanced anti-interference unit ensures that the module delivers reliable and accurate positioning data even in complex electromagnetic environments. Featuring the extraordinary positioning performance and reliability, UM982 is a perfect choice for high-precision navigation and positioning applications such as UAV, autonomous machine and precision agriculture.

Physical Characteristics

Packaging	48 pin LGA
Dimensions	16.0 × 21.0 × 2.6 mm
Weight	1.82 ± 0.03 g

Environmental Specifications

Operating Temperature	-40 °C ~ +85 °C
Storage Temperature	-55 °C ~ +95°C
Humidity	95% No condensation
Vibration	MIL-STD-810F
Shock	MIL-STD-810F

Communication Interfaces

3 × UART (LVTTL)
1 × SPI*
1 × I^2C*
1 × CAN* (shared with UART3)

Note: Items marked with * are only supported by specific firmware.

Performance Specifications

Channel	1408 channels, based on NebulasIV			
Frequency	GPS L1C/A, L2C, L2P(Y), L5			
	BDS B1I, B2I, B3I,B1C*,B2b*			
	GLONASS G1, G2			
	Galileo E1, E5a, E5b, E6*			
	QZSS L1C/A, L2C, L5, L6*			
	SBAS L1C/A			
Single Point Positioning(RMS)	Horizontal: 1.5 m			
	Vertical: 2.5 m			
DGPS (RMS)	Horizontal: 0.4 m		Heading Accuracy (RMS)	0.1°/1 m baseline
	Vertical: 0.8 m		Time Accuracy (RMS)	20 ns
RTK (RMS)	Horizontal: 0.8 cm + 1 ppm		Velocity Accuracy (RMS)	0.03 m/s
	Vertical: 1.5cm + 1 ppm		Cold Start	< 30 s
PPP (RMS)	Horizontal: 5 cm		Initialization Time	< 5 s (typical)
	Vertical: 10 cm		Initialization Reliability	> 99.9%

Observation Accuracy (RMS)	BDS	GPS	GLONASS	Galileo
B1I/L1 C/A/G1/E1 Code	10 cm	10 cm	10 cm	10 cm
B1I/L1C/A/G1/E1 Carrier Phase	1 mm	1 mm	1 mm	1 mm
B2I/L5/E5a/E5b Code	10 cm	10 cm	10 cm	10 cm
B2I/L5/E5a/E5b Carrier Phase	1 mm	1 mm	1 mm	1 mm
B3I/L2P(Y)/L2C/G2 Code	10 cm	10 cm	10 cm	10 cm
B3I/L2P(Y)/L2C/G2 Carrier Phase	1 mm	1 mm	1 mm	1 mm

Data Update Rate	Dual antenna 20 Hz (RTK+Heading)
	20 Hz raw data output
Differential Data	RTCM V3.X
Data Format	NMEA 0183, Unicore

UM980

GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency High-precision RTK Positioning Module

17.0 × 22.0 × 2.6 mm

Features

- Based on Unicore's proprietary GNSS SoC NebulasIV that integrates RF, baseband and high-precision algorithm
- All-constellation multi-frequency RTK engine and advanced RTK technology
- Instant RTK initialization technology
- 60 dB narrowband anti-jamming and jamming detection
- Heading2 technology to provide orientation information
- STANDALONE single-station high-precision positioning technology
- Supports B2b-PPP, E6-HAS and QZSS L6E (MADOCA) PPP

Applications

- Surveying and Mapping
- Precision Agriculture

UM980 is Unicore's new-generation proprietary high-precision RTK positioning module based on the GNSS SoC NebulasIV which integrates RF, baseband and high-precision algorithm. The module supports GPS, BDS, GLONASS, Galileo, QZSS, NavIC, SBAS and L-Band*. The built-in multi-frequency anti-jamming technology enhances RTK calculation on multiple modes and frequencies, which significantly improves RTK initialization time, measurement accuracy and reliability in complex environments such as city blocks and tree shades. UM980 is well suited for high-precision navigation and positioning applications such as precision agriculture, surveying and mapping and so on.

Physical Characteristics

Packaging	54 pin LGA
Dimension	17.0 × 22.0 × 2.6 mm
Weight	1.88 ± 0.03 g

Environmental Specifications

Operating Temperature	-40 °C ~ +85 °C
Storage Temperature	-55 °C ~ +95 °C
Humidity	95% No condensation
Vibration	MIL-STD-810F
Shock	MIL-STD-810F

Communication Interfaces

3 × UART (LVTTL)
1 × SPI*
1 × I²C*
1 × CAN* (shared with UART3)

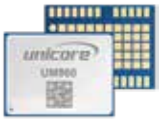
Note: Items marked with * are only supported by specific firmware or hardware

Performance Specifications

Channel	1408 channels, based on NebulasIV				
Frequency	GPS L1C/A, L1C, L2C, L2P(Y), L5				
	BDS B1I, B2I, B3I, B1C, B2a, B2b				
	GLONASS G1, G2, G3				
	Galileo E1, E5a, E5b, E6				
	QZSS L1C/A, L1C, L2C, L5, L6				
	NavIC L5				
	SBAS L1C/A				
	L-Band*				
Single Point Positioning(RMS)	Horizontal: 1.5 m				
	Vertical: 2.5 m				
DGPS (RMS)	Horizontal: 0.4 m	Time Accuracy(RMS)	20 ns		
	Vertical: 0.8 m	Velocity Accuracy (RMS)	0.03 m/s		
RTK (RMS)	Horizontal: 0.8 cm + 1 ppm	Cold Start	< 12 s		
	Vertical: 1.5 cm + 1 ppm	Initialization Time	< 5 s (typical)		
PPP (RMS)	Horizontal: 5 cm	Initialization Reliability	> 99.9%		
	Vertical: 10 cm	Data Update Rate	50 Hz		
Observation Accuracy (RMS)		BDS	GPS	GLONASS	Galileo
B1I/B1C/L1C/L1C/A/G1/E1 Code		10 cm	10 cm	10 cm	10 cm
B1I/B1C/L1C/L1C/A/G1/E1 Carrier Phase		1 mm	1 mm	1 mm	1 mm
B2I/B2a/B2b/L5/E5a/E5b Code		10 cm	10 cm	10 cm	10 cm
B2I/B2a/B2b/L5/E5a/E5b Carrier Phase		1 mm	1 mm	1 mm	1 mm
B3I/L2P(Y)/L2C/G2 Code		10 cm	10 cm	10 cm	10 cm
B3I/L2P(Y)/L2C/G2 Carrier Phase		1 mm	1 mm	1 mm	1 mm
Differential Data		RTCM V3.X			
Data Format		NMEA 0183, Unicore			

UM960

GPS/BDS/GLONASS/Galileo/QZSS
All-constellation Multi-frequency
High-precision RTK Positioning
Module



12.2 × 16.0 × 2.6 mm

Features

» High precision, low power consumption and compact size

» Based on the new generation GNSS SoC -NebulasIV, which integrates RF, baseband and high-precision algorithm

» Supports all-constellation multi-frequency on-chip RTK positioning solution

» All-constellation multi-frequency RTK engine and advanced RTK processing technology

» Tracking different frequencies independently

» 60 dB narrowband anti-jamming and jamming detection

Applications

- Robotic Lawn Mower
- Drone Light Show
- GIS Handheld
- Robotics

UM960 is Unicore's new generation high-precision RTK posititioning module based on the proprietary GNSS SoC-NebulasIV, which integrates RF, baseband and high-precision algorithm. It supports all constellations, including GPS, BDS, GLONASS, Galileo and QZSS, and can track multiple frequencies concurrently.

With its superb performance, UM960 is perfectly suited for high-precision navigation and positioning applications, such as Robotic lawn mowers, drone light show, handheld devices, high- precision GIS, robotics, etc.

Physical Characteristics

Packaging	24 pin LGA
Dimension	12.2 × 16.0 × 2.6 mm
Weight	1.11 g ± 0.03 g

Environmental Specifications

Operating Temperature	-40 °C ~ +85°C
Storage Temperature	-55 °C ~ +95°C
Humidity	95% No condensation
Vibration	MIL-STD-810F
Shock	MIL-STD-810F

Communication Interfaces

3 × UART (LVTTL)
1 × I^2C*

Note: Items marked with * are supported by specific firmware.

Performance Specifications

Channel	1408 channels, based on NebulasIV			
Frequency	GPS L1C/A, L2C, L2P, L5			
	BDS B1I, B2I, B3I, B1C, B2a, B2b*			
	GLONASS G1, G2			
	Galileo E1, E5a, E5b, E6*			
	QZSS L1C/A, L2C, L5			
	SBAS L1C/A			
Single Point Positioning(RMS)	Horizontal: 1.5 m		Time Accuracy (RMS)	20 ns
	Vertical: 2.5 m		Velocity Accuracy (RMS)	0.03 m/s
DGPS (RMS)	Horizontal: 0.4 m		Data Update Rate	20 Hz positioning
	Vertical: 0.8 m		Cold Start	< 30 s
RTK (RMS)	Horizontal: 0.8 cm + 1 ppm		Initialization Time	< 5 s (typical)
	Vertical: 1.5 cm + 1 ppm		Initialization Reliability	> 99.9%

Observation Accuracy (RMS)	BDS	GPS	GLONASS	Galileo
B1I/L1C/A/G1/E1 Code	10 cm	10 cm	10 cm	10 cm
B1I/L1C/A/G1/E1 Carrier Phase	1 mm	1 mm	1 mm	1 mm
B2I/L2P/L2C/G2/E5b Code	10 cm	10 cm	10 cm	10 cm
B2I/L2P/L2C/G2/E5b Carrier Phase	1 mm	1 mm	1 mm	1 mm
Differential Data	RTCM2.3, RTCM 3.X, CMR			
Data Format	NMEA 0183, Unicore			

UM981/UM981S

GPS/BDS/GLONASS/Galileo/QZSS All-constellation Multi-frequency RTK/INS Integrated Positioning Module

17.0 × 22.0 × 2.6 mm

Features

- Based on Unicore's proprietary GNSS SoC NebulasIV that integrates RF, baseband and high-precision algorithm
- All-constellation multi-frequency RTK engine and advanced RTK technology
- Instant RTK initialization technology
- 60 dB narrowband anti-jamming and jamming detection
- Heading2 technology to provide heading information
- STANDALONE single-station high-precision positioning technology
- Supports B2b-PPP and E6-HAS
- On-board MEMS integrated navigation and U-Fusion technology to ensure continuous positioning when loss of lock on GNSS signals occurs

Applications

- Surveying and Mapping
- Precision Agriculture

UM981 is Unicore's new-generation proprietary RTK and INS integrated navigation module. It can simultaneously track multiple satellite systems and frequencies, including GPS, BDS, GLONASS, Galileo, QZSS, NavIC and SBAS. The module integrates a high-speed floating point processor and an RTK dedicated coprocessor, being able to output positioning data at 100Hz. The on-board MEMS chip and U-Fusion integrated navigation algorithm ensure continuous positioning when loss of lock on GNSS signals occurs, providing high-quality positioning results in complex environments such as building blocks, tunnels, overpasses and tree shades. UM981 and UM981S are designed for high-precision navigation and positioning application, with UM981 for precision agriculture and UM981S for surveying and mapping, respectively.

Physical Characteristics

Packaging	54 pin LGA
Dimension	17.0 × 22.0 × 2.6 mm
Weight	1.91 g ± 0.03 g

Environmental Specifications

Operating Temperature	-40 °C ~ +85 °C
Storage Temperature	-55 °C ~ +95 °C
Humidity	95% No condensation
Vibration	MIL-STD-810F
Shock	MIL-STD-810F

Communication Interfaces

2 x UART(LVTTL) (UM981)
3 x UART(LVTTL) (UM981S)
1 x I²C*
1 x SPI*
1 × CAN* (UM981)

Note: Items marked with * are supported by specific firmware.

Performance Specifications

Channel	1408 channels, based on NebulasIV		
Frequency	GPS L1C/A, L1C, L2C, L2P(Y), L5		
	BDS B1I, B2I, B3I, B1C, B2a, B2b		
	GLONASS G1, G2, G3		
	Galileo E1, E5a, E5b, E6		
	QZSS L1C/A, L1C, L2C, L5, L6		
	NavIC L5		
	SBAS L1C/A		
Single Point Positioning(RMS)	Horizontal: 1.5 m	Time Accuracy (RMS)	20 ns
	Vertical: 2.5 m	Velocity Accuracy (RMS)	0.03 m/s
DGPS (RMS)	Horizontal: 0.4 m	Cold Start	< 12 s
	Vertical: 0.8 m	Initialization Time	< 5 s (typical)
RTK (RMS)	Horizontal: 0.8 cm + 1 ppm	Initialization Reliability	> 99.9%
	Vertical: 1.5 cm + 1 ppm	Data Update Rate	100 Hz IMU raw data
PPP (RMS)	Horizontal: 5cm		50 Hz* RTK
	Vertical: 10 cm		
Positioning Error of INS only	< 5 % of the distance traveled without GNSS signals		
Tilt Measurement（UM981S）	10 mm + 0.7 mm/° tilt (accuracy < 2.5 cm within 30°)		

Observation Accuracy (RMS)	BDS	GPS	GLONASS	Galileo
B1I/B1C/L1 C/A/G1/E1 Code	10 cm	10 cm	10 cm	10 cm
B1I/B1C/L1C/A/G1/E1 Carrier Phase	1 mm	1 mm	1 mm	1 mm
B2I/B2a/B2b/L5/G3/E5a/E5b Code	10 cm	10 cm	10 cm	10 cm
B2I/B2a/B2b/L5/G3/E5a/E5b Carrier Phase	1 mm	1 mm	1 mm	1 mm
B3I/B2a/E5a/L5 Code	10 cm	10 cm	10 cm	10 cm
B3I/B2a/E5a/L5 Carrier Phase	1 mm	1 mm	1 mm	1 mm
Differential Data	RTCM V3.X			
Data Format	NMEA 0183, Unicore			

UT986

GNSS All-constellation Multi-frequency High-accuracy Timing Module

17.0× 22.4 × 2.4 mm

Features

- Based on Unicore's proprietary GNSS SoC NebulasIV that integrates RF, baseband and high-precision algorithm
- New-generation GNSS all-constellation multi-frequency high-accuracy timing module
- Nanosecond-level PPS accuracy, with time quality indicator output
- Excellent anti-jamming capability, tracking different signals by different RF channels
- Supports interference detection and spoofing detection
- Supports single-satellite positioning and timing

Applications

- Telecom Base Station Timing
- Electrical Power Grid Timing
- Network Time Synchronization

UT986 is Unicore's new-generation proprietary GNSS high-accuracy timing module working on all systems and multiple frequencies. The module integrates filters and linear amplifiers, providing optimized RF structure and having interference suppression capability. Combining the adaptive anti-interference technology and multi-path mitigation algorithm, it supports interference detection and spoofing detection, ensuring that the module continuously provides excellent performance even in complex electromagnetic environments. UT986 delivers nanosecond-level PPS accuracy and allows multiple timing modes, including fixed-location timing, optimized-location timing, and positioning timing, enabling exceptional timing accuracy in complex signal environment.

Physical Specifications

Packaging	28 pin LCC
Dimension	17.0 × 22.4 × 2.4 mm
Weight	1.9 g

Power Supply

Voltage	3.0 V ~ 3.6 V DC
Power Consumption	700 mW (typical)

Environmental Specifications

Operating Temperature	-40 °C ~ +85 °C
Storage Temperature	-40 °C ~ +95 °C

I/O Interface

2 × UART LVTTL, baud rate: 9600 bps to 921600 bps
1 x PPS (LVTTL)

RF Input

Input Impedance	50 Ω
Antenna Gain	5 dB ~ 35 dB

Performance Specifications

Channel	1408 channels, based on NebulasIV				
Frequency	GPS L1C/A, L2C, L5				
	BDS B1I, B1C, B2a				
	GLONASS G1				
	Galileo E1, E5a, E5b				
	QZSS LC/A, L2C, L5				
TTFF	Cold Start	< 30 s			
	Reacquision	< 3 s			
Positioning Accuracy (CEP)	Horizontal: 1.5 m (dual system, open sky)				
	Vertical: 2.5 m (dual system, open sky)				
Velocity Accuracy (RMS)	0.03 m/s (dual system horizontal, open sky)				
Sensitivity (RMS)		BDS	GPS	GLONASS	Galileo
	Cold Start	-145 dBm	-147 dBm	-145 dBm	-145 dBm
	Tracking	-160 dBm	-161 dBm	-155 dBm	-155 dBm
1PPS Accuracy	< 5 ns (1σ)				
Data Update Rate	1 Hz, Up to 10 Hz				
Differential Data	RTCM V3.X				
Data Format	NMEA 0183, Unicore				

UB9A0

All-constellation Multi-frequency GNSS High-precision Board

100 x 60 x 11.4 mm

Product Characteristics

- Based on NebulasIV - a new generation multi-constellation multi-frequency high-precision GNSS SoC, with 1408 channels and powerful signal processing capability
- Supports GPS/BDS/GLONASS/Galileo/QZSS/NavIC/SBAS single-constellation standalone positioning and multi-constellation joint positioning
- Supports advanced multi-path mitigation and low elevation angle tracking
- Supports the output of carrier-phase observations with millimeter-level accuracy
- High reliability, high stability, suitable for challenging environment
- Supports RS232, Ethernet, 1PPS and external clock input
- Supports antenna signal detection and short circuit protection
- Size compatible with mainstream GNSS OEM boards on the market

Applications

- CORS
- GBAS
- Surveying and Mapping

UB9A0 is Unicore's new-generation proprietary high-precision RTK positioning board based on Unicore's proprietary GNSS SoC NebulasIV that integrates RF, baseband and high-precision algorithm, supporting GPS, BDS, GLONASS, Galileo, QZSS, NavIC and SBAS. The board provides millimeter-level carrier-phase observations and centimeter-level RTK positioning output, and supports advanced multi-path mitigation and low elevation angle tracking. UB9A0 is compatible with mainstream GNSS OEM boards on the market and provides UART, Ethernet, and other interfaces to meet the needs of users in different applications such as surveying and mapping, CORS stations, portable base stations, earthquake monitoring and global monitoring stations.

Physical Specifications

Dimensions	100 x 60 x 11.4 mm
Weight	46.5 ± 2.5 g

Environmental Specifications

Operating Temperature	-40 °C ~ +85 °C
Storage Temperature	-55 °C ~ +95 °C
Humidity	95% No Condensation
Vibration	MIL-STD-810F
Shock	MIL-STD-810F

Electrical Specifications

LNA	+3.0 V ~ +3.6 V DC
Backup Power	+2.2 V ~ +3.6 V DC
Ripple Voltage	100 mVpp (max)
Power Consumption	800 mW (typical)

Communication Interfaces

1 x UART (RS-232)
2 x UART (LVTTL)
1 x LAN, 10 / 100 M
1 × 1PPS (LVTTL)
1 × External Clock, 10M / 20M

Note: Items marked with * are supported by specific firmware.

Performance Specifications

Channel	1408 channels, based on NebulasIV			
Frequency	GPS L1C/A, L1C, L2C, L2P(Y), L5			
	BDS B1I, B2I, B3I, B1C, B2a, B2b			
	GLONASS G1, G2, G3			
	Galileo E1, E5a, E5b, E6			
	QZSS L1C/A, L1C, L2C, L5, L6			
	NavIC L5			
	SBAS L1C/A			
	L-Band*			
Single Point Positioning(RMS)	Horizontal: 1.5 m	Time Accuracy (RMS)	5 ns	
	Vertical: 2.5 m	Velocity Accuracy (RMS)	0.03 m/s	
SBAS(RMS)	Horizontal: 0.8 m	Sensitivity	Reacquisition	-148 dBm
	Vertical: 0.8 m		Tracking	-160 dBm
DGPS (RMS)	Horizontal: 0.4 m + 1ppm	TTFF	Hot Start	< 5 s
	Vertical: 0.8 m + 1ppm		Cold Start	< 12 s
RTK (RMS)	Horizontal: 0.8 cm + 1 ppm		Acquisition	1 s (Unlock ≤ 30s)
	Vertical: 1.5 cm + 1 ppm		Reacquisition	2 s (30 s ≤ Unlock ≤ 90s)
PPP (RMS)	Horizontal: 5 cm	Differential Data	RTCM V3.X	
	Vertical: 10 cm	Data Format	NMEA-0183,Unicore	
Data Update Rate	Up to 50 Hz			

Observation Accuracy (RMS)	BDS	GPS/ QZSS	GLONASS	Galileo
B1I/B1C/L1C/L1C/A/G1/E1 Code	10 cm	10 cm	10 cm	10 cm
B1I/B1C/L1C/L1C/A/G1/E1 Carrier Phase	1 mm	1 mm	1 mm	1 mm
B2I/B2a/B2b/L5/L2P(Y)/G3/E5a/E5b Code	10 cm	10 cm	10 cm	10 cm
B2I/B2a/B2b/L5/L2P(Y)/G3/E5a/E5b Carrier Phase	1 mm	1 mm	1 mm	1 mm
B3I/L2C/G2/E6 Code	10 cm	10 cm	10 cm	10 cm
B3I/L2C/G2/E6 Carrier Phase	1 mm	1 mm	1 mm	1 mm

UNICORE UFIREBIRD SERIES PRODUCTS

Products	Applications	Grade		Dimensions	GNSS						Single frequency	Dual frequency	Ports				Functions						
		Industrial grade	Automotive grade		GPS	BDS	GLONASS	Galileo	NavIC	QZSS			UART1	UART2	SPI	I²C	Built-in Flash	Data Update Rate	DR	AGNSS	Timing	RTK	
Chip																							
UFirebird II UC6580A	GIS, UAV, Automated Delivery Vehicle, Sharing Bike/Scooter, Intelligent Driving, Smart Agriculture		●	5.0 × 5.0 × 0.85 mm	●	●	●	●	○	●		●	●	●	●	●	●	1 Hz / 5 Hz / 10 Hz		●			17
UFirebird II UC6580I		●		5.0 × 5.0 × 0.85 mm	●	●	●	●	○	●		●	●	●	●	●	●	1 Hz / 5 Hz / 10 Hz		●			17
UFirebird UC6226NAS	Factory-installed Navigation, Tracker, IoT, Smart Phone, Aftermarket Navigation		●	5.0 × 5.0 × 0.75 mm	●	●	○	●		●	●		●	●			●	1 Hz		●			25
UFirebird UC6226NIS		●		5.0 × 5.0 × 0.75 mm	●	●	○	●		●	●		●	●			●	1 Hz		●			25
Module																							
UM680A	Intelligent Driving, P-Box, T-Box		●	22.0 × 17.0 × 2.6 mm	●	●	●	●	○	●		●	●	●	○	○	●	1 Hz / 5 Hz / 10 Hz		●		●	18
UM681A	Intelligent Driving, V2X, T-Box		●	22.0 × 17.0 × 2.6 mm	●	●	●	●	○	●		●	●	●	○	○	●	1 Hz / 5 Hz / 10 Hz	●	●		●	19
UM670A	Intelligent Driving, P-Box, T-Box		●	22.0 × 17.0 × 2.6 mm	●	●	●	●	○	●		●	●	●	○	○	●	1 Hz / 5 Hz / 10 Hz		●			20
UM620A	Vehicle Navigation, T-BOX, Intelligent Cockpit		●	12.2× 16.0 × 2.4 mm	●	●	●	●	○	●		●	●	●	○	○	●	1Hz/5Hz*/10Hz*		●			21
UM620	Vehicle Navigation, T-BOX, Intelligent Cockpit	●		12.2× 16.0 × 2.4 mm	●	●	●	●	○	●		●	●	●	○	○	●	1Hz/5Hz*/10Hz*		●			22
UM621A	Vehicle Navigation, T-BOX, Intelligent Cockpit		●	12.2 × 16.0 × 2.4 mm	●	●	●	●	○	●		●	●	●	○	○	●	1Hz/5Hz*/10Hz*	●	●			23
UM621	Vehicle Navigation, T-BOX, Electric Scooter	●		12.2 × 16.0 × 2.4 mm	●	●	●	●	○	●		●	●	●	○	○	●	1Hz/5Hz*/10Hz*	●	●			24
UM220-INS NL	Vehicle Navigation, T-Box	●		12.2 × 16.0 × 2.6 mm	●	●	○	●		●	●		●	●			●	1 Hz / 5 Hz / 10 Hz	●	●			26
UM220-INS NF	Vehicle Navigation, T-Box		●	12.2 × 16.0 × 2.6 mm	●	●	○	●		●	●		●	●			●	1 Hz / 5 Hz / 10 Hz	●	●			27
UM220-IV NV	Vehicle Navigation, T-BOX		●	12.2 × 16.0 × 2.4 mm	●	●	○	●		●	●		●	●			●	1 Hz / 5 Hz		●			28
UM220-IV NL	Vehicle Navigation, Vehicle Monitoring	●		12.2 × 16.0 × 2.4 mm	●	●		●		●	●		●	●			●	1 Hz		●			29
UM220-IV M0	Tracker, Vehicle Navigation	●		9.7 × 10.1 × 1.9 mm	●	●	○	●		●	●		●				●	1 Hz		●			30
UM220-IV L	Telecom Timing, Electrical Power Grid Timing, LAN Time Synchronization	●		17.0 × 22.4 × 2.4 mm	●	●	●	●			●		●	●			●	1 Hz		●	●		31

● : support ○ : support after firmware upgrade

UFirebird II
UC6580

Dual-frequency Multi-constellation GNSS Positioning SoC

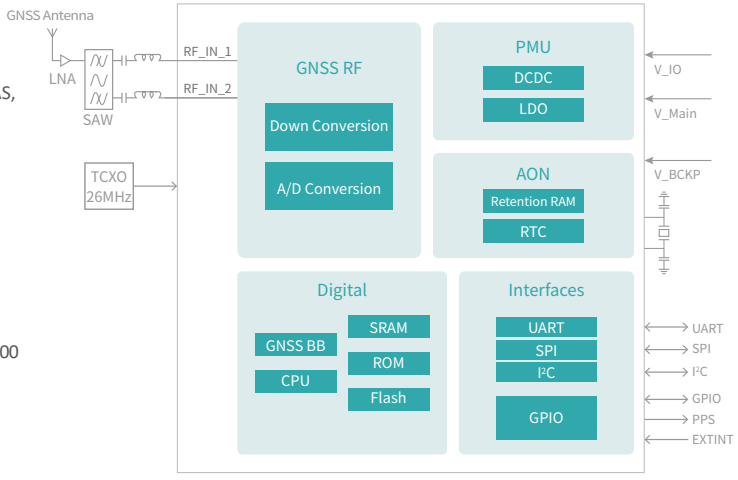
Automotive Grade

Industrial Grade

UFirebird II is a dual-frequency multi-constellation GNSS SoC with low power consumption and miniature design developed by Unicore Communications. It integrates RF and baseband on a single chip, adopts multi-path mitigation technology, anti-jamming technology and high -precision GNSS positioning technology. UFirebird II supports GPS, GLONASS, BDS, Galileo, NAVIC and QZSS multi-constellation joint positioning, and also supports SBAS signal processing, providing fast and accurate positioning service. It is suitable for vehicle navigation, robotic applications, UAVs, and handheld devices, with excellent performance especially in urban multi-path environment.

Product Features

- 96 channels
- Compact size, low power design, 5 × 5 mm QFN40 package
- Supports GPS, BDS, GLONASS, Galileo, QZSS and SBAS, including BDS-3; supports single system standalone positioning and multi-system joint positioning
- L1+L5 dual frequencies, excellent multi-path mitigation ability
- Single point positioning accuracy better than 1.5 m
- Ultra high sensitivity: tracking -162 dBm, acquisition -148 dBm
- Industrial grade & automotive grade, and the automotive grade chip qualified according to AEC-Q100
- Supports A-GNSS and DGNSS



Ordering Information

Supply at multiples of 3000 pieces

Applications

- GIS
- UAV
- Automated Delivery Vehicle
- Sharing Bike /Scooter
- Intelligent Driving
- Smart Agriculture

Performance

Channel	96 channels	
Frequency	GPS	L1 + L5
	BDS	B1I/B1C* + B2a
	Galileo	E1 + E5a
	GLONASS	G1
	QZSS	L1 + L5
	NavIC	L5*
	SBAS	L1
Single Point Positioning (CEP)	Horizontal: 1.5 m	
	Vertical: 2.5 m	
Velocity Accuracy (RMS)	0.02 m/s	
Time Accuracy (RMS)	5 ns, peak-to-peak value 30 ns (24 h)	
TTFF	Cold start < 26 s	
	Hot start < 2 s	

Sensitivity	Tracking	-162 dBm
	Cold Start	-148 dBm
	Hot Start	-156 dBm
	Reacquisition	-159 dBm
Update Rate	GNSS 1 Hz / 5 Hz / 10 Hz	
Differential Data	RTCM V3.X	
Data Format	NMEA 0183,Unicore	
Power Supply	VCC: 1.7 ~ 3.6 V	
	VIO: 1.7 ~ 3.6 V	
	Vbackup: 1.7 ~ 3.6 V	
Power Consumption @3V	< 40 mA	
Interfaces	1 × UART	
	2 × I²C	
	1 × SPI*	

	Product	Package	Flash	Operating Temp	Grade
	UC6580A	QFN40 5.0 × 5.0 × 0.85 mm	Yes	-40 ~ + 105 °C	Automotive
	UC6580I	QFN40 5.0 × 5.0 × 0.85 mm	Yes	-40 ~ + 85°C	Industrial

Note: * Supported by specific firmware

UM680A

Automotive-grade Multi-GNSS Dual-frequency High-precision RTK Positioning Module

Automotive Grade

22.0 x 17.0 x 2.6 mm

Product Characteristics

- Supports concurrent operation of GPS, BDS, GLONASS and Galileo
- Supports A-GNSS to reduce the TTFF
- GNSS chip qualified according to AEC-Q100 and production process conforms to IATF16949
- Anti-jamming design to ensure the module working stably in complex electromagnetic environment
- Centimeter-level positioning accuracy & raw data output

Applications

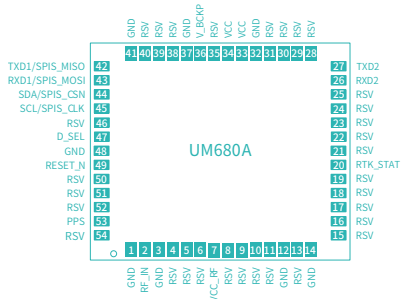
- Intelligent Driving
- P-BOX
- T-BOX

Ordering Information

Supply at multiples of 250 pieces

Brief Introduction

UM680A is a high-precision GNSS dual-frequency navigation module developed by Unicore for the intelligent driving market. Based on the proprietary multi-system dual-frequency high-performance SoC-UC6580A, the module supports multi-system dual-frequency joint positioning or single-system standalone positioning with centimeter-level accuracy.



Physical Specifications

Dimensions	22.0 x 17.0 x 2.6 mm
Package	54 pin, LGA
Operating Temperature	-40°C ~ +85 °C/105 °C
Storage Temperature	-40°C ~ +85 °C/105 °C

Electrical Specifications

Voltage	2.7 V ~ 3.6 V DC
LNA	2.7 V ~ 3.3 V, < 100 mA
Power Consumption[1]	240 mW

Interfaces

2 × UART (LVTTL)

1 × I²C*

1 × SPI*

1 × 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna, AGNSS *

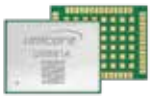
Note: * Supported by specific firmware.
1 Open sky, continuous tracking
2 68% at 30 m/s for dynamic operation,open sky

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	GPS L1C/A, L5	
	BDS B1I, B1C*, B2a	
	GLONASS G1*	
	Galileo E1, E5a	
	QZSS L1, L5	
	NavIC L5*	
	SBAS L1C/A	
Modes	Single-system standalone positioning	
	Multi-system joint positioning	
Time to First Fix (TTFF)	Cold Start: < 26 s	
	Hot Start: < 2 s	
	Reacquisition: < 2 s	
Single Point Positioning (RMS)	Horizontal: 1.5 m (open sky)	
	Vertical: 2.5 m (open sky)	
RTK (RMS)	Horizontal: 1 cm + 1 ppm (open sky)	
	Vertical: 2 cm + 1 ppm (open sky)	
Velocity Accuracy(RMS)[2]	0.05m/s	
1PPS	20 ns	
Sensitivity	BDS+GPS+GLONASS+Galileo	
	Tracking	-162 dBm
	Cold Start	-147 dBm
	Hot Start	-157 dBm
	Reacquisition	-158 dBm
Data Update Rate	1 Hz / 5 Hz / 10 Hz	
Correction	RTCM V3.V	
Data Format	NMEA 0183,Unicore	

UM681A

Automotive-grade Multi-GNSS Dual-frequency High-precision RTK & INS Integrated Positioning Module



22.0 x 17.0 x 2.6 mm

Automotive Grade

Product Characteristics

- Supports concurrent operation of GPS, BDS, GLONASS and Galileo
- Provides high-precision positioning service via standard interface
- Centimeter-level positioning accuracy & raw data output
- GNSS chip qualified according to AEC-Q100 and production process conforms to IATF16949
- Built-in MEMS, output of integrated navigation results with a single module, continuous positioning even in tunnels and underground parking lots.

Applications

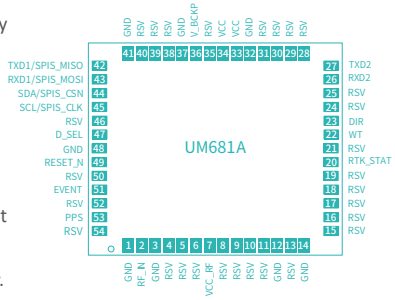
- Intelligent Driving
- V2X
- T-BOX

Ordering Information

Supply at multiples of 250 pieces

Brief Introduction

UM681A is a high-precision dual-frequency GNSS & INS integrated navigation module developed by Unicore for the intelligent driving market. Based on the proprietary multi-system dual-frequency high -performance SoC - UC6580A, the module supports multi-system dual-frequency joint positioning or single system standalone positioning with centimeter-level accuracy.



Physical Specifications

Dimensions	22.0 x 17.0 x 2.6 mm
Package	54 pin, LGA
Operating Temperature	-40 °C ~ +85 °C/105 °C
Storage Temperature	-40 °C ~ +85 °C/105 °C

Electrical Specifications

Voltage	2.7 V ~ 3.6 V DC
LNA	2.7 V ~ 3.3 V, < 100 mA
Power Consumption[1]	240 mW

Interfaces

- 2 × UART (LVTTL)
- 1 × I²C*
- 1 × SPI*
- 1 × 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna, AGNSS *

Note: * Supported by specific firmware.
1 Open sky, continuous tracking
2 68% at 30 m/s for dynamic operation,open sky

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	GPS L1C/A, L1C*, L5	
	BDS B1I, B1C*, B2a	
	GLONASS G1*	
	Galileo E1, E5a	
	NavIC L5*	
	QZSS L1, L5	
	SBAS L1C/A	
Modes	Single-system standalone positioning	
	Multi-system joint positioning	
Time to First Fix (TTFF)	Cold Start: < 26 s	
	Hot Start: < 2 s	
	Reacquisition: < 2 s	
Single Point Positioning (RMS)	Horizontal: 1.5 m (open sky)	
	Vertical: 2.5 m (open sky)	
RTK (RMS)	Horizontal: 1 cm + 1 ppm (open sky)	
	Vertical: 2 cm + 1 ppm (open sky)	
Positioning error of INS only	< 1% of the distance traveled without GNSS signals	
Velocity Accuracy(RMS)[2]	0.05 m/s (open sky)	
1PPS	20 ns	
Sensitivity	BDS+GPS+GLONASS+Galileo	
	Tracking	-162 dBm
	Cold Start	-147 dBm
	Hot Start	-157 dBm
	Reacquisition	-158 dBm
Data Update Rate	1 Hz / 5 Hz / 10 Hz	
Correction	RTCM V3.X	
Data Format	NMEA 0183, Unicore	

UM670A

Automotive-grade Multi-GNSS Dual-frequency Positioning Module

22.0 x 17.0 x 2.6 mm

Automotive Grade

Product Characteristics

- Supports concurrent operation of GPS, BDS, GLONASS and Galileo
- Dual-frequency single point positioning, providing higher accuracy and reliability compared to single-frequency solution
- Supports A-GNSS to reduce the TTFF
- GNSS chip qualified according to AEC-Q100 and production process conforms to IATF16949
- Anti-jamming design to ensure the module working stably in complex electromagnetic environment
- Supports raw data output

Applications

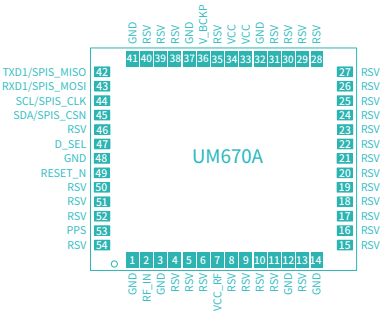
- Intelligent Driving
- P-BOX
- T-BOX

Ordering Information

Supply at multiples of 250 pieces

Brief Introduction

UM670A is a GNSS dual -frequency navigation module developed by Unicore for the intelligent driving market. Based on the proprietary multi -system dual-frequency high-performance SoC - UC6580A, the Module supports concurrent operation of GPS, BDS, GLONASS*, Galileo, QZSS and NavIC*. Different sub-models use different frequencies (L1+L5 or L1+L2) to perform single point positioning and also provide raw data output.



Physical Specifications

Dimensions	22.0 x 17.0 x 2.6 mm
Package	54 pin, LGA
Operating Temperature	-40 °C ~ + 105 °C
Storage Temperature	-40 °C ~ + 105 °C

Electrical Specifications

Voltage	2.7 V ~ 3.6 V DC Typical: 3.3 V
LNA	2.7 V ~ 3.3 V, < 100 mA
Power Consumption	150 mW

Environmental Specifications

Humidity	95% No condensation
Vibration	GB/T 28046.3； ISO 16750.3
Shock	GB/T 28046.3； ISO 16750.3

Interfaces

- 1 × UART (LVTTL)
- 1 × I²C*
- 1 × SPI*
- RESET_N
- 1 × 1PPS (LVTTL)

Functional Characteristics

- GNSS Antenna × 1

Note: * Supported by specific firmware.
1 68% at 30 m/s for dynamic operation,open sky

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	UM670A-03	UM670A-23
	BDS B1I/BIC*+B2I	BDS B1I/BIC*+B2a
	GPS L1C/A + L5	GPS L1C/A + L2C
	GLONASS G1*	GLONASS G1*+G2*
	Galileo E1 + E5a	Galileo E1 + E5b
	QZSS L1 + L5	QZSS L1 + L2
	NavIC L5*	-
	SBAS L1C/A	SBAS L1
VSWR	≤ 2.5	
Input impedance	50 Ω	
Antenna Gain	15 dB ~ 30 dB	
Time to First Fix (TTFF)	Cold Start: < 26 s	
	Hot Start: < 2 s	
	Reacquisition: < 2 s	
Single Point Positioning (RMS)	Horizontal: 1.5 m (open sky)	
	Vertical: 2.5 m (open sky)	
Velocity Accuracy(RMS)[1]	0.05 m/s (open sky)	
1PPS	20 ns	
Sensitivity	GNSS	
	Tracking	-162 dBm
	Cold Start	-147 dBm
	Hot Start	-157 dBm
	Reacquisition	-158 dBm
Data Update Rate	1 Hz / 5 Hz / 10 Hz	
Correction	RTCM V3.X	
Data Format	NMEA 0183, Unicore	

UM620A

Automotive-grade Multi-GNSS Dual-frequency Positioning Module

Automotive Grade

16.0 x 12.2 x 2.4 mm

Product Characteristics

- Automotive-grade dual-frequency navigation and positioning module
- Supports GPS L1 C/A, L5; BDS B1I, B1C*, B2a; GLONASS G1; Galileo E1, E5a; NavIC L5*; QZSS and SBAS
- Supports multi-system dual-frequency positioning, multi-system single-frequency positioning, or single-system standalone positioning
- GNSS chip qualified according to AEC-Q100 and productition process conforms to IATF16949
- Anti-jamming design to ensure the module working stably in complex electromagnetic environments

Applications

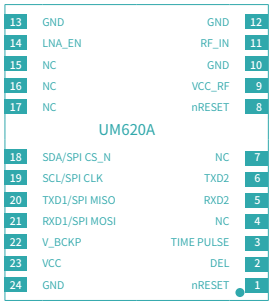
- Vehicle Navigation
- T-BOX
- Intelligent Cockpit

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM620A is an automotive-grade GNSS dual-frequency navigation module developed by Unicore Communications for the automotive market. Based on the proprietary multi-system dual-frequency high-performance SoC-UC6580A, the module supports multi-system dual-frequency positioning, multi-system single-frequency positioning, or single-system standalone positioning, ensuring high positioning accuracy even in complex environments such as multi-path surroundings.



Physical Specifications

Dimensions	12.2 x 16.0 x 2.4 mm
Package	24 pin, SMD
Temperature	Operating -40 °C ~ +85 °C
	Storage -40 °C ~ +85 °C

Electrical Specifications

Voltage	2.7V ~ 3.6 V DC
LNA	2.7V ~ 3.3 V, <100 mA
Power Consumption[3]	300 mW

Interfaces

2 × UART (LVTTL)
1 × I²C*
1 × SPI*
1 × 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna,
AGNSS*

Note: * Supported by specific firmware.
1 Open sky
2 68% at 30 m/s for dynamic operation,open sky
3 Open sky, continuous tracking

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	GPS L1C/A, L5	
	BDS B1I, B1C*, B2a	
	GLONASS G1	
	Galileo E1, E5a	
	NavIC L5*	
	QZSS L1, L5	
	SBAS L1C/A	
Modes	Single-System Standalone Positioning	
	Multi-System Joint Positioning	
Time to First Fix (TTFF)[1]	Cold Start : < 26 s	
	Hot Start : < 2 s	
	Reacquisition : < 2 s	
Positioning Accuracy(CEP)[1]	Horizontal: 1.5 m (Dual-frequency quad-system)	
Velocity Accuracy(RMS)[2]	0.05 m/s	
1PPS	20 ns	
Sensitivity	GNSS	
	Tracking	-162 dBm
	Cold Start	-148 dBm
	Hot Start	-158 dBm
	Reacquisition	-160 dBm
Data Update Rate	1 Hz / 5 Hz* / 10 Hz*	
Data Format	NMEA 0183, Unicore	

UM620

Industrial-grade Multi-GNSS Dual-frequency Positioning Module

12.2 × 16.0 × 2.4 mm

Industrial Grade

Product Characteristics

- Industrial-grade dual-frequency navigation and positioning module
- Supports GPS L1 C/A, L5; BDS B1I, B1C*, B2a; GLONASS G1; Galileo E1, E5a; NavIC L5*; QZSS and SBAS
- Supports multi-system dual-frequency positioning, multi-system single-frequency positioning, or single-system standalone positioning
- Anti-jamming design to ensure the module working stably in complex electromagnetic environments
- Algorithm adaptable to low-dynamic application scenarios

Applications

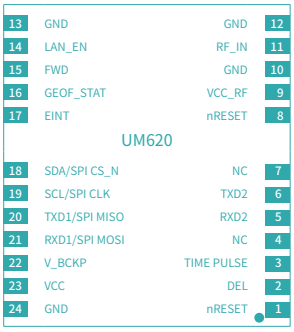
- Vehicle Navigation
- T-BOX
- Intelligent Cockpit

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM620 is an industrial-grade GNSS dual-frequency navigation module developed by Unicore Communi-cations. Based on the proprietary multi-system dual-frequency high-performance SoC-UC6580I, the module supports multi-system dual-frequency positioning, multi-system single-frequency positioning, or single-system standalone positioning, ensuring high positioning accuracy even in complex environments such as multi-path surroundings.



Physical Specifications

Dimensions	12.2 x 16.0 x 2.4 mm
Package	24 pin, SMD
Temperature	Operating -40 °C ~ +85 °C
	Storage -40 °C ~ +85 °C

Electrical Specifications

Voltage	2.7 V ~ 3.6 V DC
LNA	2.7 V ~ 3.3 V, < 100 mA
Power Consumption[3]	150 mW

Interfaces

2 × UART (LVTTL)

1 × I²C*

1 × SPI*

1 × 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna, AGNSS*

Note: * Supported by specific firmware
1 Open sky
2 68% at 30 m/s for dynamic operation, open sky
3 Open sky, continuous tracking

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	GPS L1C/A, L5	
	BDS B1I, B1C*, B2a	
	GLONASS G1	
	Galileo E1, E5a	
	NavIC L5*	
	QZSS L1, L5	
	SBAS L1C/A	
Positioning Mode	Single-System Standalone Positioning	
	Multi-System Joint Positioning	
Time to First Fix (TTFF)[1]	Cold Start: < 26 s	
	Hot Start: < 2 s	
	Reacquisition: < 2 s	
Positioning Accuracy (CEP)[1]	Horizontal: 1.5 m (Dual-frequency quad-system)	
Velocity Accuracy (RMS)[2]	0.05 m/s	
1PPS	20 ns	
Sensitivity	GNSS	
	Tracking	-162 dBm
	Cold Start	-148 dBm
	Hot Start	-158 dBm
	Reacquisition	-160 dBm
Data Update Rate	1 Hz / 5 Hz* / 10 Hz*	
Data Format	NMEA 0183, Unicore	

UM621A

Automotive-grade Multi-GNSS Dual-frequency Integrated Positioning Module

16.0 x 12.2 x 2.4 mm

Automotive Grade

Product Characteristics

- Automotive-grade dual-frequency GNSS+MEMS integrated navigation and positioning module
- Supports GPS L1 C/A, L5; BDS B1I, B1C*, B2a; GLONASS G1; Galileo E1, E5a; NavIC L5*; QZSS and SBAS
- Supports multi-system dual-frequency positioning, multi-system single-frequency positioning or single-system standalone positioning
- Built-in MEMS to output integrated positioning results with a single module
- Supports odometer pulse input
- Supports the output of integrated positioning results and GNSS-only positioning results through one serial port
- 100% continuous navigation even in tunnels or underground parking lots
- GNSS chip qualified according to AEC-Q100; production process conforms to IATF16949

Applications

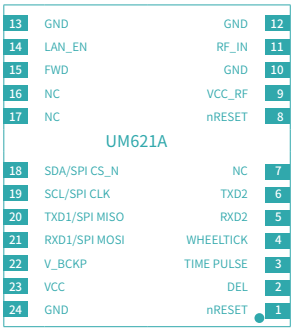
- Vehicle Navigation
- T-BOX
- Intelligent Cockpit

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM621A is a GNSS dual-frequency + MEMS integrated navigation module developed by Unicore Communi -cations for the automotive market. Based on the proprietary multi-system dual-frequency high -performance SoC-UC6580A, and equipped with a 6-axis MEMS device, the module supports multi -system dual-frequency joint positioning or single -system standalone positioning, and can directly output GNSS+MEMS integrated positioning results, which ensures the continuity of positioning even in tunnels or underground parking lots.



Physical Specifications

Dimensions	16.0 x 12.2 x 2.4 mm
Package	24 pin SMD
Temperature	Operating -40°C ~ +85 °C
	Storage -40 °C ~ +85 °C

Electrical Specifications

Voltage	2.7 V ~ 3.6 V DC
LNA	2.7 V ~ 3.3 V, <100 mA
Power Consumption[3]	330 mW

Interfaces

2 × UART (LVTTL)
1 × I²C*
1 × SPI*
1 × SPEED
1 × FWD
1 × 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna,
AGNSS *

Note: * Supported by specific firmware.
1 Open sky
2 68% at 30 m/s for dynamic operation, open sky
3 Open sky, continuous tracking

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	GPS L1C/A, L5	
	BDS B1I, B1C*, B2a	
	GLONASS G1	
	Galileo E1, L5a	
	NavIC L5*	
	QZSS L1, L5	
	SBAS L1C/A	
Positioning Mode	Single-System Standalone Positioning	
	Multi-System Joint Positioning	
Time to First Fix (TTFF)[1]	Cold Start: < 26 s	
	Hot Start: < 2 s	
	Reacquisition: < 2 s	
Positioning Accuracy(CEP)[1]	Horizontal: 1.5 m (Dual-frequency quad-system, open sky)	
Positioning Error of INS only	< 2 % of the distance traveled without GNSS signals	
Velocity Accuracy(RMS)[2]	0.05 m/s	
1PPS	20 ns	
Sensitivity	GNSS	
	Tracking	-162 dBm
	Cold Start	-148 dBm
	Hot Start	-158 dBm
	Reacquisition	-160 dBm
GNSS Data Update Rate	1 Hz / 5 Hz* / 10 Hz*	
INS Data Update Rate	50 Hz / 100 Hz	
Data Format	NMEA 0183, Unicore	

UM621

Industrial-grade Multi-GNSS Dual-frequency Integrated Positioning Module

16.0 x 12.2 x 2.4 mm

Industrial Grade

- Industrial-grade dual-frequency GNSS+MEMS integrated navigation and positioning module
- Supports GPS L1 C/A, L5; BDS B1I, B1C*, B2a; GLONASS G1; Galileo E1, E5a; NavIC L5*; QZSS and SBAS
- Supports multi-system dual-frequency positioning, multi-system single-frequency or positioning single-system standalone positioning
- Built-in MEMS to output integrated positioning results with a single module
- Supports odometer pulse input
- Supports the output of integrated positioning results and GNSS-only positioning results through one serial port
- 100% continuous navgation even in tunnels or underground parking lots
- Algorithm adaptable to low-dynamic application scenarios

Applications

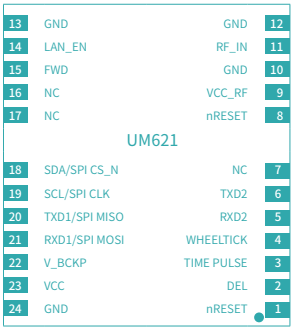
- Vehicle Navigation
- T-BOX
- Electric Scooter

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM621 is a GNSS dual-frequency + MEMS integrated navigation module developed by Unicore Communications. Based on the proprietary multi-system dual-frequency high-performance SoC-UC6580I, and equipped with a 6-axis MEMS device, the module supports multi-system dual-frequency joint positioning or single-system standalone positioning, and can directly output GNSS + MEMS integrated positioning results, which ensures the continuity of positioning even in tunnels or underground parking lots.



Physical Specifications

Dimensions	16.0 x 12.2 x 2.4 mm
Package	24 pin SMD
Temperature	Operating -40°C ~ +85 °C
	Storage -40 °C ~ +85 °C

Electrical Specifications

Voltage	2.7 V ~ 3.6 V DC
LNA	2.7 V ~ 3.3 V, <100 mA
Power Consumption[3]	168 mW

Interfaces

2 × UART (LVTTL)
1 × I²C*
1 × SPI*
1 × SPEED
1 × FWD
1 × 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna,
AGNSS *

Note: * Supported by specific firmware.
1 Open sky
2 68% at 30 m/s for dynamic operation, open sky
3 Open sky, continuous tracking

Performance Specifications

Channel	96 channels, based on UFirebird II	
Frequency	GPS L1C/A, L5	
	BDS B1I, B1C*, B2a	
	GLONASS G1	
	Galileo E1, L5a	
	NavIC L5*	
	QZSS L1, L5	
	SBAS L1C/A	
Positioning Mode	Single-System Standalone Positioning	
	Multi-System Joint Positioning	
Time to First Fix (TTFF)[1]	Cold Start: < 26 s	
	Hot Start: < 2 s	
	Reacquisition: < 2 s	
Positioning Accuracy(CEP)[2]	Horizontal: 1.5 m (Dual-frequency quad-system, open sky)	
Positioning Error of INS only	< 2 % of the distance traveled without GNSS signals	
Velocity Accuracy(RMS)[2]	0.05 m/s	
1PPS	20 ns	
Sensitivity	GNSS	
	Tracking	-162 dBm
	Cold Start	-148 dBm
	Hot Start	-158 dBm
	Reacquisition	-160 dBm
GNSS Data Update Rate	1 Hz / 5 Hz* / 10 Hz*	
INS Data Update Rate	50 Hz / 100 Hz	
Data Format	NMEA 0183, Unicore	

UFirebird
UC6226

Multi-GNSS Positioning SoC

Automotive Grade

Industrial Grade

Product Advantages

- Ultra-low power consumption
- Supports GPS, BDS, GLONASS, Galileo single-system standalone positioning and multi-system joint positioning
- Built-in anti-jamming technology, adaptable to various environments
- High integration, simple peripheral devices, cost-effective
- Compatible with mainstream package

Applications

- Tracker
- Smart Phone
- IoT
- Vehicle Navigation
- Wearables

Brief Introduction

UFirebird UC6226 features ultra-low power consumption and ultimate miniaturization, significantly improving the battery life of users' devices.

UC6226 is developed for global applications, supporting GPS, BDS, GLONASS, Galileo multi-system joint positioning. The high-integration design reduces the use of peripheral devices and the board area. UC6226 adopts QFN40 package and complies with the AEC-Q100 reliability standard.

Ordering Information

Supply at multiples of 3000 pieces.

Performance Specifications

Channel	64 channels	
Frequency	GPS L1, BDS B1, GLONASS G1, Galileo E1 (Concurrent reception of 2 or 3 GNSS signals)	
Positioning Accuracy (CEP)	Horizontal： < 2.0 m	
Velocity Accuracy (RMS)	0.1 m/s	
Time To First Fix (TTFF)[1]	Cold Start < 28 s	
	AGNSS[2] < 4 s	
	Hot Start < 1 s	
	Reacquisition < 1 s	
Sensitivity	GNSS	
	Tracking	-160 dBm
	Cold Start	-147 dBm
	Hot Start	-154 dBm
	Reacquisition	-158 dBm

Power Consumption @ 3.3 V	Acquisition 24 mA (dual-GNSS joint positioning)
	Tracking 12 mA (dual-GNSS joint positioning)
Interfaces	UART× 2
Data Format	NMEA0183, Unicore
Data Update Rate	1 Hz
Firmware	Flash
Operating Temperature	-40 °C ~ +85 °C
Other Functions	Anti-jamming: Built-in, active detection and removal
	LNA: Built-in
	RTC input: 32.768 kHz
	DC/DC: Built-in, optional

Product	Package	Flash	Grade	Main Supply	IO Supply
UC6226NIS-E310E1	QFN40 5.0 × 5.0 × 0.75 mm	Yes	Industrial	3.0 ~ 3.6 V	3.0 ~ 3.6 V
UC6226NIS-E310E2	QFN40 5.0 × 5.0 × 0.75 mm	Yes	Industrial	1.2 ~ 1.98 V	1.7 ~ 1.9 V
UC6226NAS	QFN40 5.0 × 5.0 × 0.75 mm	Yes	Automotive	3.0 ~ 3.6 V	3.0 ~ 3.6 V

Note: 1. Satellite signal strength reaching -130 dBm
2. Timely input of assisted data

UM220-INS NL

Industrial-grade Multi-GNSS Integrated Navigation and Positioning Module

16.0 x 12.2 x 2.6 mm

Industrial Grade

Product Characteristics

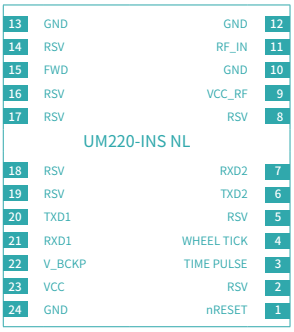
- Miniaturized All-in-One design
- Built-in MEMS to output integrated positioning results with a single module
- 100% continuous navgation even in tunnels or underground parking lots
- GNSS + INS integrated navigation algorithm, supporting odometer pulse input
- Supports A-GNSS

Applications

- Vehicle Navigation
- T-BOX

Brief Introduction

UM220-INS NL is an industrial-grade GNSS+MEMS module designed for vehicle navigation. Based on Unicore's proprietary low power consumption GNSS SoC-UC6226, and with the built-in 6-axis MEMS, UM220-INS NL can directly output GNSS + MEMS integrated positioning results, which is most suitable for applications requiring high accuracy, high reliability, and high continuity.



Ordering Information

Supply at multiples of 500 pieces

Physical Specifications

Dimensions	16.0 x 12.2 x 2.6 mm
Package	24 pin SMD
Temperature	Operating -40 °C ~ +85 °C
	Storage -45 °C ~ +90 °C

Electrical Specifications

Voltage	3.0 V ~ 3.6 VDC
LNA Feed	3.0 V ~ 3.3 V
Power Consumption[3]	90 mW

Interfaces

- 2 x UART(LVTTL)
- 1 x SPEED
- 1 x FWD
- 1 x 1PPS(LVTTL)

Note: 1 Simultaneously running three systems at most. Using command to switch between BDS and GLONASS.
2 Typical Value, < 3 0m/s open sky
3 Open sky, continuous tracking

Performance Specifications

Channel	64 channels, based on UFirebird		
Frequency[1]	GPS L1		
	BDS B1		
	Galileo E1		
	GLONASS G1		
	QZSS		
	SBAS		
Modes	Single-System Standalone Positioning	Positioning Accuracy(CEP)	Horizontal: 2.0 m (Dual-System)
	Multi -System Joint Positioning		< 3% of distance traveled without GNSS signals
Time to First Fix (TTFF)	Cold Start: < 28 s	Velocity Accuracy[2](RMS)	0.1 m/s
	Hot Start: < 1 s		
	Reacquisition: < 1 s		
Data Update Rate	1 Hz / 5 Hz / 10 Hz	1PPS	Support
Sensitivity	GNSS		
	Tracking -161 dBm		
	Cold Start -147 dBm		
	Hot Start -154 dBm		
	Reacquisition -157 dBm		
Data Format	NMEA 0183, Unicore		

UM220-INS NF

Automotive-grade Multi-GNSS Integrated Navigation and Positioning Module

12.2 × 16.0 x 2.6 mm

Automotive Grade

Product Characteristics

- Miniature All-in-One design
- Built-in MEMS to output integrated navigation and positioning results with a single module
- 100% continuous navigation even in tunnels and underground parking lots
- GNSS + INS integrated navigation algorithm, supporting odometer pulse input
- Supports A-GNSS

Applications

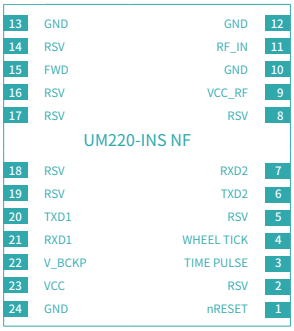
- Vehicle Navigation
- T-Box

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM220-INS NF is an automotive-grade GNSS+MEMS module designed for vehicle navigation. Based on Unicore's proprietary low power consumption GNSS SoC-UC6226, and with the built-in 6-axis MEMS, UM220-INS NF can directly output GNSS + MEMS integrated positioning results. It is most suitable for applications requiring high accuracy, high reliability, and high continuity.



Physical Specifications

Dimensions	12.2 × 16.0 x 2.6 mm
Package	24 pin SMD
Temperature	Operating -40 °C ~ +85 °C
	Storage -45 °C ~ +90 °C

Electrical Specifications

Voltage	3.0 V ~ 3.6 VDC
LNA Feed	3.0 V ~ 3.3 V
Power Consumption[3]	90 mW

Interfaces

2 x UART(LVTTL)
1 x SPEED
1 x FWD
1 x 1PPS(LVTTL)

Note: 1 Simultaneously running three systems at most. Using command to switch between BDS and GLONASS.
2 Typical Value, < 3 0m/s open sky
3 Open sky, continuous tracking

Performance Specifications

Channel	64 channels, based on UFirebird		
Frequency[1]	GPS L1		
	BDS B1		
	Galileo E1		
	GLONASS G1		
	QZSS		
	SBAS		
Modes	Single-System Standalone Positioning	Positioning Accuracy(CEP)	Horizontal: 2.0 m (Dual-System)
	Multi -System Joint Positioning		< 3% of distance traveled without GNSS signals
Time to First Fix (TTFF)	Cold Start: < 28 s	Velocity Accuracy[2](RMS)	0.1 m/s
	Hot Start: < 1 s		
	Reacquisition: < 1 s	1PPS	Support
Data Update Rate	1 Hz / 5 Hz / 10 Hz		
Sensitivity	GNSS		
	Tracking -161 dBm		
	Cold Start -147 dBm		
	Hot Start -154 dBm		
	Reacquisition -157 dBm		
Data Format	NMEA 0183, Unicore		

UM220-IV NV

Automotive-grade Multi-GNSS
Navigation and Positioning Module

12.2 × 16.0 x 2.4 mm

Automotive Grade

Product Characteristics

- Automotive grade, GNSS SoC conforming to AEC-Q100 standard and production in line with IATF16949 standard
- Excellent navigation and positioning performance, supports single-system standalone positioning and multi-system joint positioning
- Anti-jamming design, which enables the module to work stably under complex electromagnetic environments
- Low power consumption design
- Supports A-GNSS, DGNSS
- Compatible with mainstream GPS modules, cost saving
- Raw observation output (optional)
- SMD, easy for users to produce

Applications

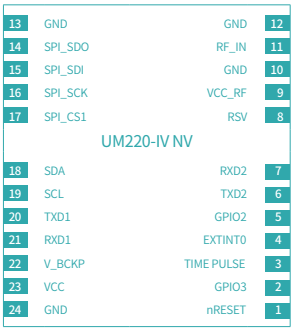
- Vehicle Navigation
- T-BOX

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM220-IV NV is a multi-system positioning module developed by Unicore Communications for the vehicle navigation market. It is the fourth generation automotive-grade GNSS module based on Unicore's proprietary GNSS SoC-UC6226, with high integration, low power consumption, and anti-jamming design. UM220-IV NV is suitable for large-scale GNSS applications that require high performance, high reliability, and high quality.



Physical Specifications

Dimensions	12.2 x 16.0 x 2.4 mm
Package	24 pin SMD
Weight	0.8 g
Temperature	Operating -40 °C ~ +85 °C
	Storage -45 °C ~ +90 °C

Electrical Specifications

Voltage	3.0 V ~ 3.6 V DC
LNA	3.0 V ~ 3.3 V, < 100 mA
Power Consumption[4]	90 mW

Interfaces

2 x UART
1 x 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna,
A-GNSS*, raw observation output

Note: The parts marked with * are supported by specific firmware.
1 Concurrent operation of three systems at most, using corresponding command to switch between BDS and GLONASS; 2 Open sky; 3 Typical value, < 30m /s open sky; 4 Open sky, continuous tracking

Performance Specifications

Channel	64 channels, based on UFirebird		
Frequency[1]	GPS L1		
	BDS B1		
	Galileo E1		
	GLONASS G1		
	QZSS		
	SBAS		
Modes	Single-system standalone positioning or multi-system joint positioning		
Time to First Fix (TTFF)[2]	Cold Start: < 28 s	Positioning Accuracy (CEP)[3]	Horizontal: 2.0 m Vertical: 3.5 m
	Hot Start: < 1 s		
	Reacquisition: < 1 s	Velocity Accuracy(RMS)[3]	0.1 m/s
	A-GNSS: < 4 s		
Data Update Rate	1 Hz / 5 Hz	1PPS	Support
Sensitivity	GNSS		
	Tracking -161 dBm		
	Cold Start -147 dBm		
	Hot Start -154 dBm		
	Reacquisition -157 dBm		
Data Format	NMEA 0183, Unicore		

UM220-IV NL

Industrial-grade Multi-GNSS
Navigation and Positioning Module

Industrial Grade

16.0 x 12.2 x 2.4 mm

Product Characteristics

- Excellent navigation and positioning performance, supporting single-system standalone positioning and multi-system joint positioning
- Anti-jamming design, which enables the module to work stably under complex electromagnetic environments
- Low power consumption design
- Hardware compatible with previous generation products and mainstream GPS modules
- Supports NMEA V4.1 protocol
- Surface Mount Device which facilitates users to produce
- Raw observation data output (optional)

Applications

Vehicle Navigation

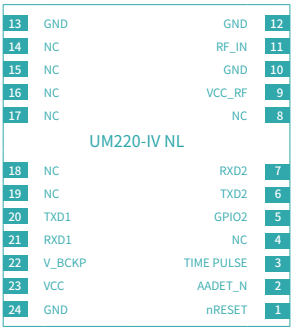
Vehicle Monitoring

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM220-IV NL is a multi-system GNSS module based on Unicore's proprietary low-power high-performance SoC-UFirebird. It supports AGNSS function, which improves the positioning speed with the help of assisted data transmitted through network. The module also supports high-precision solution on the user's hardware platform to improve positioning accuracy. UM220-IV NL is of compact size and adopts SMT pad, supporting standard pick-and-place and fully automated integration of reflow soldering, particularly suitable for low cost and low power consumption applications.



Physical Specifications

Dimensions	12.2 x 16.0 x 2.4 mm
Package	24 pin SMD
Weight	0.8 g
Temperature	Operating -40 °C ~ +85 °C
	Storage -45 °C ~ +90 °C

Electrical Specifications

Voltage	3.0 V ~ 3.6V DC
LNA	3.0 V ~ 3.3V, < 100 mA
Power Consumption[2]	50 mW

Interfaces

2 x UART (LVTTL)

1 x 1PPS (LVTTL)

Functional Characteristics

AGNSS *

Raw observation output

Note: * Supported by specific firmware
1 Open sky, using TruePoint RTK algorithm
2 Open sky, continuous tracking
3 Typical value, < 30m /s open sky
4 Open sky, continuous tracking

Performance Specifications

Channel	64 channels, based on UFirebird		
Frequency[1]	GPS L1		
	BDS B1		
	Galileo E1		
	QZSS		
Modes	Single-system standalone positioning or multi-system joint positioning		
Time to First Fix (TTFF)[1]	Cold Start: < 28 s	Positioning Accuracy (CEP)[3]	Horizontal: 2.0 m
	Hot Start: < 1 s		Vertical: 3.5 m
	Reacquisition: < 1 s	Velocity Accuracy(RMS)[3]	0.1 m/s
	A-GNSS: < 4 s		
Data Update Rate	1 Hz		
1PPS	Support		
Sensitivity	GNSS		
	Tracking	-160 dBm	
	Cold Start	-147 dBm	
	Hot Start	-151 dBm	
	Reacquisition	-158 dBm	
Data Format	NMEA 0183, Unicore		

UM220-IV M0

Industrial-grade Multi-GNSS
Navigation and Positioning Module

9.7 x 10.1 x 1.9 mm

Industrial Grade

Product Characteristics

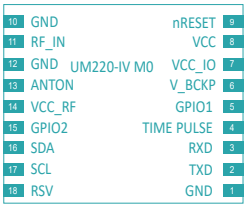
- Ultra-small packaging
- Compact design, small size
- Excellent performance, supporting single-system standalone positioning and multi-system joint positioning
- Anti-jamming technology, which enables the module to work stably in complex electromagnetic environments
- Low power consumption
- Suitable for large-scale applications that require high performance, small size and low cost

Applications

- Tracker
- Vehicle Navigation

Brief Introduction

UM220-IV M0 is a multi-system compact navigation module designed for the automotive market. As the fourth generation of GNSS navigation and positioning module, UM220-IV M0 is based on Unicore's proprietary GNSS SoC UC6226. It is highly integrated, with low power consumption, anti-jamming design, compact size, and is suitable for applications requiring low cost.



Ordering Information

Supply at multiples of 1000 pieces

Physical Specifications

Dimensions	9.7 x 10.1 x 1.9 mm
Package	18 pin SMD
Temperature	Operating -40 °C ~ +85 °C
	Storage -45 °C ~ +90 °C

Electrical Specifications

Voltage	3.0 V ~ 3.6 V DC
LNA	3.0 V ~ 3.3 V, <100 mA
Power Consumption[4]	90 mW

Interfaces

1 x UART (LVTTL)

1 x 1PPS (LVTTL)

Functional Characteristics

Passive Antenna, Active Antenna,
AGNSS *

Note: Supported by specific firmware
1 Simultaneously running three systems at most.Using command to switch between BDS and GLONASS.
2 Open sky.
3 Typical value < 30 m/s open sky.
4 Open sky, continuous tracking.

Performance Specifications

Channel	64 channels, based on UFirebird	
Frequency[1]	GPS L1	
	GLONASS G1	
	BDS B1	
	Galileo E1	
	QZSS	
	SBAS	
Modes	Single-System Standalone Positioning	
	Multi-System Joint Positioning	
Time to First Fix (TTFF)[2]	Cold Start < 28 s	
	Hot Start < 1 s	
	Reacquisition < 1 s	
	AGNSS < 4 s	
Data Update Rate	1 Hz	
Positioning Accuracy (CEP)[3]	Horizontal: 2.0 m	
	Vertical: 3.5 m	
Velocity Accuracy[3](RMS)	0.1 m/s (GNSS)	
1PPS	Support	
Sensitivity	GNSS	
	Tracking	-161 dBm
	Cold Start	-147 dBm
	Hot Start	-155 dBm
	Reacquisition	-158 dBm
Data Format	NMEA 0183, Unicore	

UM220-IV L

Multi-GNSS Single-frequency Timing Module

Industrial Grade

17.0 × 22.4 × 2.4 mm

Product Characteristics

- Multi-mode single-frequency timing, with the timing accuracy better than 20ns
- Supports GPS + BDS/GLONASS + Galileo, as well as BDS-3 constellation
- Supports single satellite timing, ensuring high reliability even if there is only one visible satellite
- Supports antenna open circuit warning and short circuit protection
- Compatible with mainstream GPS timing modules and saving cost

Applications

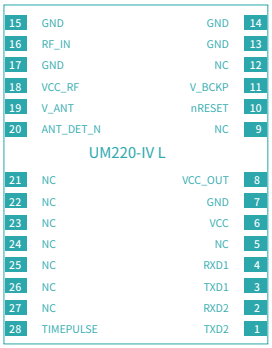
- Telecom Base Station Timing
- Electrical Power Grid Timing
- Network Time Synchronization

Ordering Information

Supply at multiples of 500 pieces

Brief Introduction

UM220-IV L is a timing module developed for telecom timing and electrical power grid timing, supporting GPS, BDS, GLONASS, and Galileo. The module is based on Unicore's proprietary low-power SoC-UFirebird UC6226, and supports multi-mode timing. It features high accuracy, high stability, high reliability, and is suitable for large-scale GNSS timing appilications.



Physical Specifications

Dimensions	17.0 × 22.4 × 2.4 mm
Weight	1.7 g
Package	28 pin SMD
Operating Temperature	-40°C ~ +85°C
Storage Temperature	-40°C ~ +85°C

Electrical Specications

Voltage	3.0 V ~ 3.6 V DC
LNA	3.0 V ~ 3.3 V, < 100 mA
Power Consumption[2]	62 mW @3.3V

Interfaces

2 x UART
1 x 1PPS

Functional Characteristics

Passive antenna, active antenna
Single satellite timing mode

Note: The parts marked with * are supported by specific firmware.
1 Typical value, < 30 m/s open sky
2 Open sky, continuous tracking

Performance Specifications

Channel	64 channels, based on UFirebird	
Frequency	GPS L1C/A	
	BDS B1I	
	GLONASS G1	
	Galileo E1	
Modes	Single-System Standalone Positioning	
	Multi-System Joint Positioning	
Positioning Accuracy (CEP)[1]	Horizontal: 2.0 m	
	Vertical: 3.5 m	
1PPS	Better than 20 ns (1σ)	
Time to First Fix (TTFF)	Cold Start < 30 s	
	Hot Start < 1 s	
	Reacquisition < 1 s	
Sensitivity	GNSS	
	Tracking	-160 dBm
	Cold Start	-147 dBm
	Hot Start	-155 dBm
	Reacquisition	-155 dBm
Data Update Rate	1 Hz	
Data Format	NMEA 0183, Unicore	

AUTOMOTIVE APPLICATIONS

Recommended products

UM680A
UM681A
UM670A

INTELLIGENT DRIVING

High-precision positioning is a vital part of intelligent driving. High-precision RTK positioning provides centimeter-level position and speed information, and when using a dual-antenna heading receiver, it can determine the direction of the vehicle. It can be integrated with inertial device to provide high frequency position, velocity, altitude and time information, ensuring continuous operation even when the GNSS signal is blocked.

Unicore high-precision products offer accurate positioning and heading information with low latency, ensuring high reliability and safety for autonomous vehicles, suitable for low-speed applications such as logistics vehicles, cleaning vehicles, shuttle vehicles, intelligent driving passenger cars, intelligent driving freight trucks and other large-scale applications in different application scenarios.

Intelligent Driving Applications

The application scenarios include: high-precision map collection, route planning, intelligent parking, three-dimensional intelligent transportation, intelligent driving, etc. The products have been adopted by many intelligent connected vehicle brands, applied in a variety of mass-produced cars, as well as used in sightseeing vehicles and patrol vehicles.

VEHICLE NAVIGATION

In recent years, with the acceleration of the urban construction process, urban roads and highways have developed rapidly, and the scope of human activities has become wider and wider. Automobile users need to adapt to the increasingly complex road network and road conditions, find the best route among the roads winding through high-rise buildings, avoid getting lost when traveling to a new city, and find the exit of the underground parking lot.

Along with these needs, vehicle navigation system has become popular and is developing towards multi-constellation joint positioning. In-dash navigation products have undergone strict quality testing by the vehicle manufacturer, providing users with high-quality navigation experience with stable and reliable quality assurance.

Unicore provides automotive-grade products for the vehicle navigation applications. Based on multi-system fusion GNSS algorithm and GNSS+MEMS integrated navigation technology, the products provides users with continuous and reliable positioning experience. The production process strictly follows the IATF16949 requirements, AEC-Q100 and RoHS2.0 standards to ensure first-class quality, which is very suitable for automobile factory to use and other high-end navigation applications.

Recommended products

UM220-IV NV

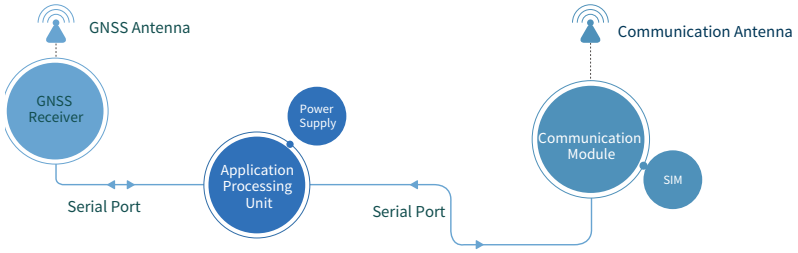
UM220-INS NF

UM220-INS NL

UM621A

UM620A

VEHICLE MONITORING



Vehicle monitoring terminals receive signals from GNSS satellites, combining with vehicle status information, to perform data communication with the monitoring and control center.

Monitoring terminals upload the vehicle's location, movement state and alarm information in real time to the monitoring center and the monitoring center sends the traffic and warning information to the vehicle terminals through communication network to realize real-time scheduling and controlling management.

The navigation and positioning function is primary for vehicle monitoring terminals, and GNSS navigation module is the core part. Unicore UM220 series modules have excellent navigation and positioning performance, with fast TTFF and stable ability of signal acquisition and tracking in complex environments. The advanced multi-path mitigation technology ensures high positioning accuracy and reliability.

Unicore's products take the lead in large-scale applications and have been widely adopted by many manufacturers for mass production.

Recommended product

UM220-IV NL

GNSS EMBEDDED REARVIEW MIRRORS
GNSS RADAR DETECTORS

Auxiliary tools of driving including rear view mirrors, watchdogs and automobile data recorders integrated with positioning function can help drivers to record route and road conditions. It enables drivers to have a clear idea of the road conditions and avoid breaking traffic rules while providing evidence in case of disputes arising during driving.

Internet of Vehicles (IOV), after mounted with intelligent devices such as cloud-based rear view mirrors, can provide location based services. With a booming IOV market, the cloud-based rear view mirror, which plays an important role in vehicle networking and positioning, has become the core device of IOV and foresees a promising market in the future.

Recommended products

UC6226

UM220-IV N SERIES

UM220-IV M0

Recommended products

UC6226

UM220-IV NL

UM220-IV M0

ON-BOARD DIAGNOSTICS (OBD)

Intelligent vehicle-mounted terminals equipped with OBD may provide various information such as GNSS track, remote diagnosis and reminding of vehicle error, CAN data stream report, statistics of mileage, oil consumption and speed, alarming of vehicle collision and statistics of vehicle conditions.

Vehicle-mounted terminals equipped with OBD are important parts of IOV, providing comprehensive vehicle services and new experiences for the car owner during its whole life cycle; it also provides online vehicle management and service platform for automobile dealers and innovative modes of after-sale market service. Intelligent vehicle-mounted terminals provide core data for IOV and help to establish big data platform based on IOV.

INDUSTRY APPLICATIONS

CORS

Recommended products

UB9A0

The Continuously Operating Reference System (CORS) is one of the modern information infrastructures based on the dynamic, continuous, fast and high-precision network to acquire spatial data and geographical features. It can provide services for mobile positioning, the construction of dynamic and continuous spatial reference frame, and the determination of geodynamic parameters. As an important infrastructure providing geodetic and geospatial information, CORS is widely used in various industries and fields such as surveying and mapping, transportation, security, and location-based services.

As the key part of the CORS, the reference stations are evenly distributed in the coverage area. They are responsible for collecting GNSS satellite observations and transmitting them to the data processing center, as well as providing system integrity monitoring service. One of the core components of the reference station is the high-precision reference station receiver.

Unicore's UB-series boards support multiple satellite navigation systems including GPS, BDS, GLONASS and Galileo, and can provide millimeter-level carrier phase observations, with excellent signal tracking capability under low elevation angle and multi-path suppression capability. Unicore products also provide plenty of peripheral interfaces such as network, external clock, and 1PPS, as well as concise and easy-to-use Web configuration interface, which is particularly designed for CORS application.

CORS Application

Unicore base station receivers have been widely and successfully applied to CORS projects.

SURVEYING

Satellite positioning and navigation technology has brought a technological revolution for the surveying area and GNSS RTK products have become basic instruments. Compared with traditional surveying methods, GNSS products are more accurate, easy to use, small in size, easy to carry and can operate in all weather conditions. They are widely used in geodetic surveying, resource exploration, monitoring, engineering survey, land survey, city management and deformation monitoring.

The surveying and mapping instruments based on Unicore's RTK modules and boards provide ultra-high positioning accuracy and availability in harsh environments such as urban building blocks, tree shades and places with strong multi-path signals, with more reliable positioning results, especially suitable for high-precision measurement and positioning applications. The interfaces of Unicore's high- precision boards are compatible with the mainstream boards on the market, which is convenient to use, helping users to reduce the R&D cycle and saving cost.

Surveying applications

Unicore's high-precision boards have been widely used in GNSS base station receivers, integrated RTK rover stations, handheld GIS devices, etc.

Recommended products

UM980

UM981S

UM960

UBA90

PRECISION AGRICULTURE

Recommended products

UM982

UM981

Precision agriculture is a new trend of modern agriculture. By analyzing information of farmland soil, crop growth, plant diseases and insect pests, farmers can obtain information about the amount of seeds, fertilizers, water, and pesticides required for crops that change with space and location. Combined with intelligent agricultural machinery system, precision agriculture can save the input of various raw materials, reduce the production cost, increase the land yield, and protect environment at the same time.

The agricultural machinery system uses high-precision satellite observation to realize automatic navigation. The controller controls the driving direction and throttle of the machine to make it automatically drive according to the preset route (straight or curve), reducing the omission and overlap of the operation, and improving the quality of machinery operation. The automatic navigation system of agricultural machinery can also operate at night and under complex weather conditions, which improves the efficiency of agricultural operation, reduces the skill requirements for the operator and reduces labor intensity. The system can be used in farmland operations such as ridging, seeding, spraying, and harvesting, improving the precision of agricultural operations and improving the quality of agricultural products.

Precision Agriculture Application

Unicore's multi-system multi-frequency RTK technology provides positioning accuracy better than 2cm and orientation accuracy of 0.1°/1m baseline, ensuring the straight-line tracking and steering accuracy required by agricultural automatic navigation systems. At present, many domestic and overseas agricultural machinery integrators have adopted Unicore's high-precision products.

UAV

Recommended products

UM982

UM960

UC6580

The UAV is widely used in aerial photogrammetry, oil pipeline inspection, power line inspection, agricultural plant protection, aerial surveillance, film and television shooting, family entertainment and other fields. The core to achieve autonomous flight control of UAV is the flight control system, which plays an important part in UAV stability, data transmission reliability, position accuracy and timeliness, and plays a decisive role in its flight performance. In the flight control system, the GNSS receiver, as the most important sensor, provides real-time location and heading information for the UAV.

To ensure the UAV successfully completing preset tasks, its starting and destination position need to be configured in advance, and parameters such as position, speed, navigation attitude and heading also need to be communicated in real time. GNSS receiver is able to provide a reliable, economic and efficient way to obtain such information.

The GNSS high-precision modules developed by Unicore can provide real-time meter, decimeter and centimeter level positioning, support high-precision positioning and heading solutions using single board dual antennas or dual boards dual antennas, and achieve relative positioning in motion to meet the demands of various UAV flight control systems.

The UAV is very popular among a large number of users and also has many amateur loyal supporters beyond the professional fields. The core unit of UAV is the flight control system. As the most important position sensors, GNSS positioning provides location information for the UAV flight control system and also serves as foundation for a series of interesting applications such as automatic UAV return.

The positioning chips of Unicore featured by high performance and low power consumption are designed for differented UAV applications. Combined with sensor fusion algorithm, the chips can achieve accurate 3D positioning in multiple scenarios with low power consumption.

UAV Application

Unicore's high-precision products have been massively used by many domestic leading UAV manufacturers, with the largest market share.

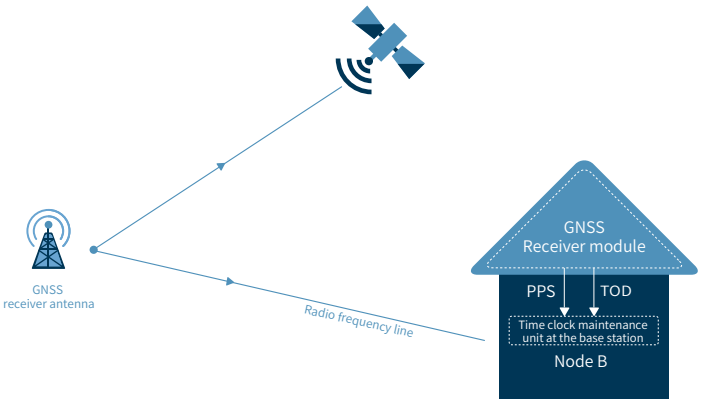
PRECISION TIMING

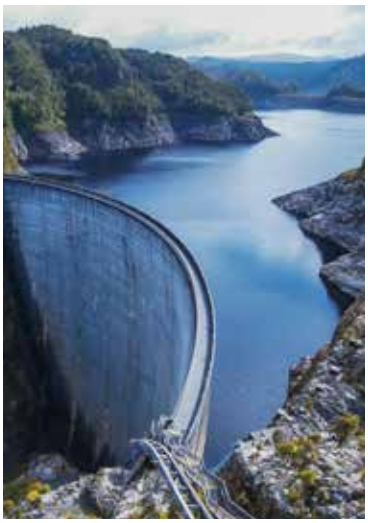
Recommended products

UT986

UM220-IV L

In the modern information society, the construction of communication network, electric power network, financial network and transportation network is increasingly dependent on time and frequency. Time synchronization technology with high precision and high reliability is the key to the normal operation of each network system. Satellite timing has become a widely used time synchronization technology due to its high accuracy, wide geographical coverage and ease of use, and plays an important role in communication, electric power and financial industries. Unicore's proprietary GNSS satellite timing modules can provide nanosecond-level timing accuracy to meet the high requirements of time synchronization. The modules adopt advanced interference suppression technology and RF structure design, which are more adaptable to complex electromagnetic environment. The diversified application configuration meets the requirements of different industries.





SAFETY MONITORING

Recommended products

UM960

Geological disasters such as debris flow, landslides, surface subsidence in the mining areas and safety operation of man-made buildings including reservoir dams, long-span bridges and super high-rise buildings are closely related to displacement deformation. The high-precision satellite positioning and navigation technology is widely used in different kinds of displacement monitoring and safety pre-warning systems as it offers automation, precision, fastness, all weather compatibility and low cost.

The use of multiple GNSS and multiple frequencies can effectively improve the accuracy of displacement monitoring in complex observation environment, improve the reliability of the system operation, and shorten the monitoring and early warning time.

Unicore's high-precision boards and modules can provide better than 1mm carrier phase observation accuracy. The reliable low-elevation tracking performance and super-low observation noise help to simplify the data processing work for the software. It is especially suitable for displacement monitoring application with the accuracy at millimeter level.

IoT AND CONSUMER APPLICATIONS

IoT

Internet of Things (IoT) is a network for smart devices to connect with each other. It uses sensors, communication technology and global navigation satellite system to digitize the real world, combining AI and big data technology to analyze data and make decisions. Each device can respond according to the environment, exchange data with other devices, work automatically without human involvement, and achieve the perfect combination of things and the Internet. IoT can improve management and production efficiency, making life smarter and safer.

Recommended products

UC6226

UC6580

UM220-IV M0

Location information and communication technology are the core of IoT devices. Each IoT device serves as a sensing unit, and the system collects data from each unit and gives feedback based on the changes in the location of the sensing unit. On the one hand, the integration of GNSS and communication makes it easier for industrial customers to use IoT, which improves reliability and reduces the development cycle. On the other hand, the complexity and diversity of the environment in which IoT devices are located, the randomness of the devices' placement, the miniaturization of the devices themselves, and the long standby times also pose new challenges for GNSS chips.

Unicore's UC6226 chip, with 28nm process technology and ingenious PMU design, has the features of both low power consumption and miniaturization, significantly improving the battery life of user's equipment. The product supports GPS, BDS, GLONASS and Galileo joint positioning (BDS and GLONASS cannot run in parallel), which meet the requirements of global market applications.

With the advent of the era when everything is connected through the Internet, the IoT market has entered an unprecedented stage of rapid development. Communication + positioning have become the two most critical functions in this field. Unicore's UC6226 chip and UM220 series modules are active in many IoT applications.

CONSUMER UAV

The drones are very popular among a large number of users. Beyond professional fields such as performance drones, there are also amateur loyal supporters applying them in aerial photography. The core unit of UAV is the flight control system. As the most important position sensor, GNSS chip provides position information for the UAV flight control system and also serves as foundation for a series of interesting applications such as automatic UAV return.

Unicore's high-performance chip with low power consumption is suitable for different market segments. Combined with the sensor fusion algorithm, it can provide accurate 3D positioning information while saving power for users.

Recommended product

UC6226

UC6580

ROBOTICS

Recommended products

UM980

UM982

UM960

With the development of technology, robots have moved from factory production lines to outdoor life, from inspection robots in substations and gas stations, to agricultural spraying and fertilizing robots, to soccer field line painting robots and lawn mowers. As the application of outdoor inspection and service robots is becoming more and more popular, the technology is also becoming increasingly mature. GNSS, as the main technology for outdoor positioning, can achieve different levels of positioning accuracy covering sub-meter, decimeter and centimeter, with the help of differential correction data and precise point positioning technology. It can also be combined with inertial navigation, vision sensors, radars and other sensors to achieve high-precision positioning in various complex environments.

In combination with electronic map and path planning algorithms, GNSS can accurately locate and orient robots to automatically travel according to the planned route. For the GNSS module with a single antenna, it can provide accurate position and orientation information of a moving robot. For the GNSS module with dual antennas, even if the robot is not moving, the module can also provide accurate position and orientation information. Unicore's small-sized positioning modules support both single antenna and dual antennas, and have been successfully applied to various outdoor robots such as inspection robots, line painting robots, agricultural spraying robots and lawn mower robots.

Robot applications

Unicore's high-precision products have been applied in batches by many leading manufacturers of robotic lawn mowers and line painting robots.

TRACKERS

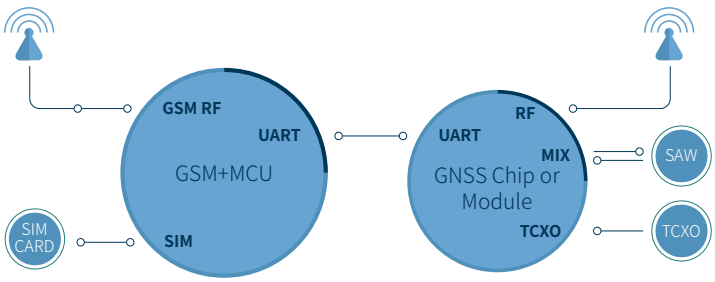
Recommended products

UM220-IV M0

UM621

There are vast demands for caring and safety services targeting various groups and fields including senior citizens, kids, pets, tourism, public security, logistics and delivery, vehicle monitoring and mobile resource management. Demands for positioning of person and property are also rising with the advancement of life quality, work efficiency, business development and society progress.

Bicycle sharing is the most typical tracker and IoT application. Bicycles integrated with navigation and positioning functions enable unlocking via Internet, positioning on platform, electronic fence, search and prevention of burglary; it also derives many more personal applications such as vehicle appointment, error report and intelligent planning of vehicles.



Recommended products

UC6226

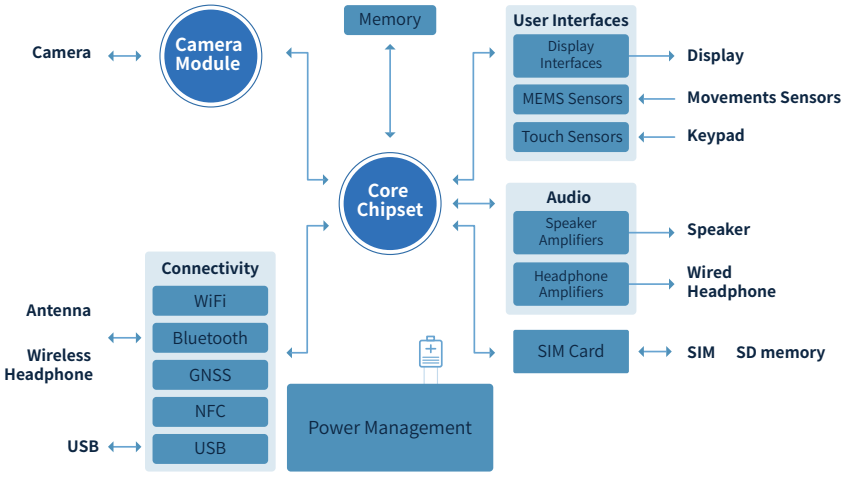
UM220-IV M0

UM620

MOBILE PHONES AND TABLET PCS

Over the years, navigation and positioning have become the standard features of tablets and mobile phones, allowing users to get position information at anytime and anywhere. Speech recognition and multiple built-in sensors (including gyroscopes and magnetic field sensors) greatly increase the positioning accuracy and user experience of map navigation. Meanwhile, the accurate positioning performance enables more location-based services and increases their efficiency. Users therefore can enjoy the convenience and values brought about by the location-based services at any time.

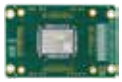
Tablets and mobile phones with Unicore's GNSS chips provide multi-system jointing positioning service for users. Unicore's products are preferred by customers for their compact size, fast positioning speed and accurate positioning performance, being widely used in mass market tablets and mobile phones, as well as handheld devices in public safety and maritime applications.



SERVICE AND SUPPORT

EVK

Evaluation Kit

EVK	Supported Product	Component	Document	Figure
NebulasIV Series Products EVK				
HPL EVK 5.0 Kit	UM980eb UM981eb UM981Seb UM982eb UM960eb UM960Leb UT986eb UM680Aeb UM681Aeb UT670A	HPL EVK 5.0 x 1 Power adapter x 1 DB9 crossover serial cable x 2 Antenna RF cable x 2	HPL EVK 5.0 Kit Quick Guide	
UM980eb UM981eb UM981Seb	UM980 UM981 UM981S	—	UM980eb User Manual UM981eb User Manual UM981Seb User Manual	
UM982eb	UM982	—	UM982eb User Manual	
UM960eb	UM960	—	UM960eb User Manual	
UT986eb	UT986	—	UT986eb User Manual	
UFirebird Series Products EVK				
UC6580 EVK Suite	UC6580I UC6580A	Active antenna USB cable UC6580 EVK	UC6580 EVK Suite Quick Guide	
UM680Aeb UM681Aeb UM670Aeb	UM680A UM681A UM670A	—	UM680Aeb User Manual UM681Aeb User Manual UM670Aeb User Manual	
UM620 Series EVK Suite	UM620A UM620	Active antenna USB cable UM620 Series EVK	UM620 Series EVK Suite Quick Guide	
UM621 Series EVK Suite	UM621A UM621	Active antenna USB cable UM621 Series EVK	UM621 Series EVK Suite Quick Guide	
UC6226NIS EVK Suite	UC6226NIS	Power adapter Active antenna Alligator clip test leads USB cable UC6226NIS EVK	UC6226NIS EVK Suite Quick Guide	
UM220-IV N EVK Suite	UM220-IV NL UM220-IV NV	Active antenna USB cable UM220-IV N EVK	UM220-IV N EVK Suite Quick Guide	
UM220-INS N EVK Suite	UM220-INS NF UM220-INS NL	Active antenna USB cable UM220-INS N EVK	UM220-INS EVK Suite Quick Guide	
UM220-IV M EVK Suite	UM220-IV M0	Active antenna USB cable UM220-IV M EVK	UM220-IV M0 EVK Suite Quick Guide	

UPRECISE

GNSS EVALUATION SOFTWARE

UPrecise is a GNSS evaluation software independently developed by Unicore. It features a user-friendly interface and simple operations.

Product Features

- Adaptable to Unicore products with graphical user interface
- Visualization of real-time positioning data to display satellite signals, positioning, heading, and attitude information
- Easy configuration of frequently used commands
- Real-time message parsing with descriptions to help users analyze positioning data

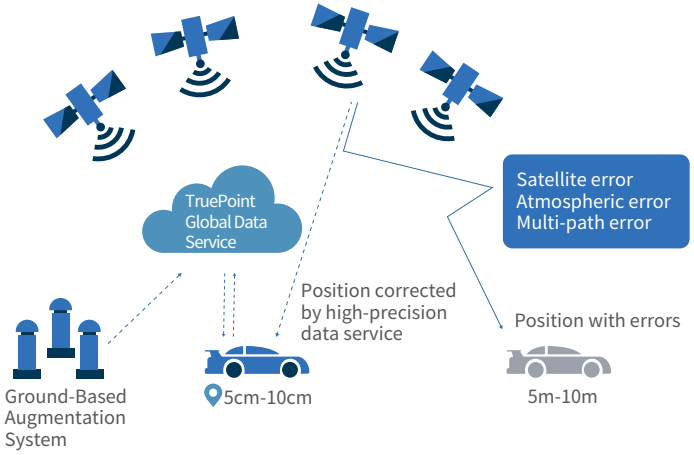
BUILT-IN HIGH-PRECISION GNSS CORRECTION SERVICE

The GNSS-based positioning technology requires data service to achieve centimeter-level high-precision positioning. Based on the globally distributed and regionally encrypted ground-based augmentation system (GBAS), the cloud service platform provides decimeter and centimeter-level high-precision data, which can be combined with the high-precision positioning algorithms such as RTK and PPP-RTK built in the GNSS chip/module to eliminate positioning errors and achieve decimeter or centimeter-level positioning accuracy.

Unicore chips and TruePoint data services are fully integrated by the Chip-to-Cloud technology, and the hardware chips and software algorithms are well adapted to each other in terms of the GBAS, GNSS chip/module, edge computing algorithm and cloud computing algorithm. In addition to the customized supplementary correction information, the positioning performance and availability are improved in complex environment. Besides, multi-functional SDK with troubleshooting and OTA upgrade function is provided to simplify the integration work and bring better experience for customers.

Product Advantages

- High-precision positioning service built in the chip/module (activation required)
- Chip-to-Cloud integrated technology to improve the positioning performance
- Easy-to-use, multi-functional SDK available
- Trustworthy, with good after-sales service to improve customer experience



A-GNSS

LOCATION ASSISTANCE SERVICE

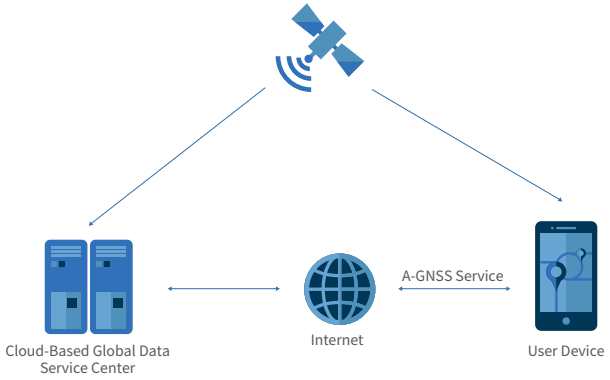
Focusing on the challenge of instantaneous positioning in various application scenarios, A-GNSS service can accelerate the time to first fix (TTFF) of cold start to 2~5 seconds, supports dual modes of real-time ephemeris and predicted ephemeris, enables smartphones, smart wearable devices, IoT and other terminal devices to be located in seconds, reduces power consumption of terminal devices, and improves the user-side positioning experience.

Assistance Data Type	Ephemeris, almanac, approximate position and time
Ephemeris Validity Period	Real-time ephemeris: 2 to 4 hours; Predicted ephemeris: up to 31 days
Supported Constellations	GPS, GLONASS, Galileo, QZSS, BDS
Ephemeris File Size	Real-time ephemeris: 3kB/constellation Predicted ephemeris: GPS: 98kB/14 days GAL: 70kB/14 days BDS: 139kB/14 days GLONASS: 73kB/14 days QZSS: 13kB/14 days

Note: The predicted ephemeris file size is related to the number of satellites and the number of predicted days, and is approximately 0.23K/day/constellation.

Advantages of A-GNSS Service

- A-GNSS service built in the chip/module (activated required)
- TTFF improved to 2 ~ 5 seconds
- Real-time ephemeris and predicted ephemeris dual-mode available
- Power consumption reduced and operating hours extended
- Dynamic combination of five constellations and supports A-GPS and A-BDS



QUALITY

Superior Product Quality

Adhering to the concept of “strict standards and high quality", Unicore implements quality management throughout the product life cycle based on systematic and in-process management approaches to deliver high-quality and highly reliable products to customers.

The chips are produced by integrated circuit manufacturing enterprises; each chip is carefully created in accordance with the industry's rigorous reliability test standards to ensure the superior quality.

The high quality of modules is guaranteed by strict in-house inspection and reliability testing, hundreds of thousands of hours of drive testing and 100% factory testing, functional and performance testing by authoritative third-party organizations, and automotive grade products meeting the requirement of ISO16750.

Continuously pursuing excellent quality, Unicore has always maintained a leading position in the industry, delivering navigation chips and modules with long-term reliability.

Product Certification

» AEC-Q100-certified automotive-grade chips

» JESD47-certified industrial-grade chips

» CE-certified products

» FCC-certified products

» RoHS2.0-certified products

» REACH-certified products

» IATF16946-certified processes

» ISO9001:2015

» QC080000

High Customer Satisfaction

With a consistent pursuit of high customer satisfaction, Unicore has always been committed to delivering superior products and efficient and high-quality services. For such commitment, a rapid customer communication and feedback system has been put in place in Unicore to ensure timely handling of problems from customers.

Production Quality Control

- Complete PPAP and sufficient DFM experience to ensure the new product introduction
- Industry-leading SMT production line and equipment to ensure the quality and reliability of product processing
- Automated FCT to improve the test efficiency and consistency
- EBS, MES and WMS systems to realize the traceability of material sources and the whole process of production

Selection of Suppliers and Partners

- Components: Electronics from premium brands in the industry
- Manufacturer: Internationally well-known automotive manufacturers

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