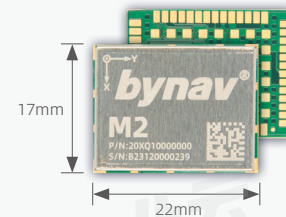


M21 High-precision Combined Navigation Module

Deeply-coupled GNSS/IMU Anti-jamming L-Band

Brief Introduction

M21 is a high-precision combined navigation module, it has 54 pins with package of LGA. The high-precision measurement engine, navigation engine and functional safety processor are integrated in the module. It supports the anti-jamming of 65 dBC narrowband, high-performance RTK and deeply-coupled combined navigation solution to deal with harsh environments such as satellite signal interference and multipath. It can provide continuous, real-time and reliable high-precision position and attitude, and can be applied to automated driving, drones, precision agriculture, surveying, mapping, etc.



Technological Advantage



Deeply-coupled Combined Navigation Algorithm

Built-in with a MEMS IMU, it enables DR calculation, allowing continuous output of high-precision position and velocity information even in brief occlusion scenarios. It supports the deeply coupled combined navigation algorithm based on the Bynav Alice SoC, which improves the quality of GNSS observation. In environments like urban canyons, its positioning accuracy is 2 to 5 times better than loosely coupled algorithms.



Full Constellation & Frequency GNSS Signal Solution

It supports BDS/GPS/GLONASS/Galileo/QZSS Full Constellation & Frequency high-precision RTK solution. And the built-in Bynav REAL (Ransac Enhanced Advanced Location) GNSS positioning engine has integrity monitoring to improve the fault tolerance and fixed solution rate under multipath and interference conditions in urban area, it can provide more stable and accurate results.



High-performance Multiple Interference Suppression

SAIF (Smart Advanced Interference Defense), the high-performance multiple interference suppression technology with high AD quantization bits, is built in and capable of handling different interferences such as single-frequency, multitone, sweeping, pulse, narrowband with interference-signal ratio of 65 dBC. It can address common interference signals in complex electromagnetic environments, and greatly improve the availability and integrity of high-precision positioning in vehicle scenarios.



L-Band*, CLAS*, B2b (PPP)* and E6 (HAS)*

It supports L-Band* SBAS signal reception, can provide high-precision positioning in environments where conventional differential services or mobile communication services are unavailable. It supports BeiDou-3 B2b PPP* and E6 HAS* solutions, fully utilizing the four-frequency signals from BeiDou and Galileo to significantly improve PPP convergence speed and enhance the availability of high-precision positioning.

Feature

- » Independent Intellectual Property Rights
- » Full Constellations and Full Frequency (1507 Channels)
- » High-performance Anti-jamming*
- » Deeply-coupled Combined Navigation
- » Built-in High-precision Functional-safety IMU, with 100% Full-Temperature Calibration
- » Support Ethernet Port, Embedded SDK Differential Account, Support gPTP Time Synchronization
- » AP Partition Design Ensures Stable and Reliable OTA Upgrades
- » Support System Self-check and Fault Diagnosis*

Application



Intelligent Driving



Agriculture



Drone



Intelligent Robot

Performance

Constellation: GPS, BDS, GLO, GAL, QZSS, NavIC

Number of Channel: 1507

Tracking

L-Band*	3 channels, 1525~1559 MHz
BDS-2	B1I, B2I, B3I
BDS-3	B1I, B1C*, B2a, B2b (PPP)*
GPS	L1 C/A, L1C*, L2, L5
GLO	G1, G2
GAL	E1, E5a, E5b, E6 (HAS)*
QZSS	L1 C/A, L1C, L2, L5, L6 (CLAS)*
NavIC	L5
SBAS*	L1 C/A

Anti-jamming*

Single-frequency, Multitone, Sweeping, Pulse, Narrowband;
Interference-Signal Ratio: 65 dBc

Interfaces

UART	×4
SPI*	×1
CAN FD	×2
ANT_DETECT	×1
PPS	×1
RMII	×1

Horizontal Positioning Accuracy (RMS)^{1,2}

Single Point	1.5 m
RTK	1.0 cm + 1 ppm

Vertical Positioning Accuracy (RMS)^{1,2}

Single Point	2.5 m
RTK	1.5 cm + 1 ppm

Max. Output Rate

GNSS Observation ⁹	5 Hz
GNSS Positioning Result ⁹	5 Hz
INS Positioning Result	100 Hz
IMU Raw Data	100 Hz
DR Accuracy (2σ)^{1,3}	0.8 %

Time To First Fix

Cold Start ^{3,5}	≤ 30 s
Hot Start ^{4,5}	≤ 5 s

RTK Initialization¹

	≤ 5 s
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Re-acquisition Time

	≤ 1 s
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Timing Accuracy (RMS)⁷

	≤ 20 ns
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Velocity Accuracy⁶

	0.03 m/s
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RTK Solution Delay

	≤ 50 ms
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IMU

Gyroscope	
Measure Range (° /s)	± 300
Angle Random Walk (° /h)	0.5
Bias instability (° /h)	5
Bias (° /s)	0.3
Scale Error	4‰
Cross Coupling Error	1.7‰ (0.1°)
Accelerometer	
Measure Range (g)	± 16
Velocity random walk (m/s/√h)	0.3
Bias instability (μg)	50
Bias (mg)	5
Scale Error	2‰
Cross Coupling Error	0.9‰ (0.05°)
System Functional Safety*	ASIL B

Mechanical and Electrical

Size	17.0 × 22.0 × 2.75 mm
Package	54 pin LGA
Weight	2 g
Power Consumption ⁸	500 mW
Power Supply Range	3.0~3.6 V

Environment and Certification

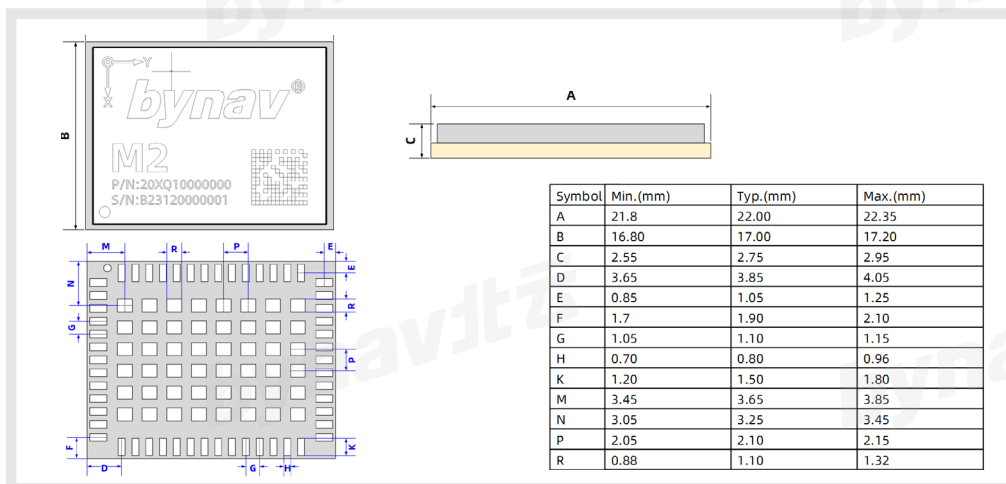
Operation Temperature ¹⁰	-40 °C ~ +85 °C
Storage Temperature ¹¹	-55 °C ~ +150 °C
Humidity	95% Non-condensing
Vibration	JESD22-B103
Shock	JESD22-B110

IATF 16949*

ISO 26262 ASIL B*

AEC-Q104*

Mechanical Specification



Note:

- Typical value. Performance will be affected by GNSS status, satellites' location, baseline length, multipath and other interference;
 - Using 1 km baseline and the receiver with good antenna performance, without considering possible errors due to antenna phase center offset;
 - Typical value. There is no almanac, ephemeris and approximate position or time;
 - Typical value. Almanac, ephemeris and approximate position or time are preserved;
 - 130dBm and more than 12 satellites are available;
 - Open sky without any obstruction, 99% @ static;
 - Optional. Bias caused by RF and antenna is not included;
 - Typical value. Power of antenna and peripherals is not included;
 - 10Hz is supported in special firmware;
 - There is optional temperature range of -40°C ~105°C ;
 - There is optional temperature range of -40°C ~150°C ;
- * Optional, supported in special firmware.

More information, please refer to



www.bynav.com



Wechat Official Account

Please contact us for more information of products!

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