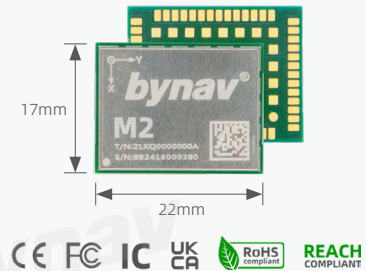


M22 High-precision Combined Navigation Module

Deeply-coupled GNSS/IMU YAW Augmentation L-Band

Brief Introduction

M22 is a high-precision combined navigation module, it has 54 pins with package of LGA. The MEMS IMU (6-axis IMU + single-axis YAW + gyroscope) 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



Full-Temperature Calibrated IMU Deeply-Coupled Navigation

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 which can improve the GNSS observation quality. So the original automatic driving positioning unit (like P-BOX or IMU-BOX assembly) can be replaced to reduce system complexity and cost, simplify wiring and improve vehicle integration.



Full Constellation & Frequency GNSS Signal Reception

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.



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.



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

- » 22nm Process GNSS SoC, Alice
- » Full Constellations and Full Frequency (1507 Channels)
- » YAW Augmentation (6+1 Axis), the Bias Instability is 1°/h
- » High-performance Anti-jamming*
- » Built-in High-precision Functional-safety IMU, with 100% Full-Temperature Calibration
- » Deeply-coupled Combined Navigation (DR Accuracy 0.2%)
- » 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



Intelligent
Robot



UGV

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)*, B3I
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	x4
SPI*	x1
CAN FD	x2
ANT_DETECT	x1
PPS	x1
RMII	x1

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	10 Hz
GNSS Positioning Result ⁹	5 Hz
INS Positioning Result	100 Hz
IMU Raw Data	100 Hz

DR Accuracy (2σ)¹¹ 0.2 %

Time To First Fix

Cold Start^{3,5} 30 s

Hot Start^{4,5} 5 s

RTK Initialization¹ 5 s

Re-acquisition Time ≤ 1 s

Timing Accuracy (RMS)⁷ ≤ 20 ns

Velocity Accuracy⁶ 0.03 m/s

RTK Solution Delay 50 ms

IMU

Gyroscope	
Measure Range (° /s)	± 300 (XY) ; ± 460 (Z)
Angle Random Walk (° /h)	0.5 (XY) ; 0.08 (Z)
Bias instability (° /h)	5 (XY) ; 1 (Z)
Bias (° /s)	0.3 (XY) ; 0.07 (Z)
Scale Error	4 (XY) ; 2 (Z)
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 2.15 g

Power Consumption* 510 mW

Power Supply Range 3.15~3.45 V

Environment and Certification

Operation Temperature¹⁰ -40 °C ~ +85 °C

Storage Temperature -40°C ~ +105 °C

Humidity 95% Non-condensing

Vibration JESD22-B103

Shock JESD22-B110

IATF 16949*

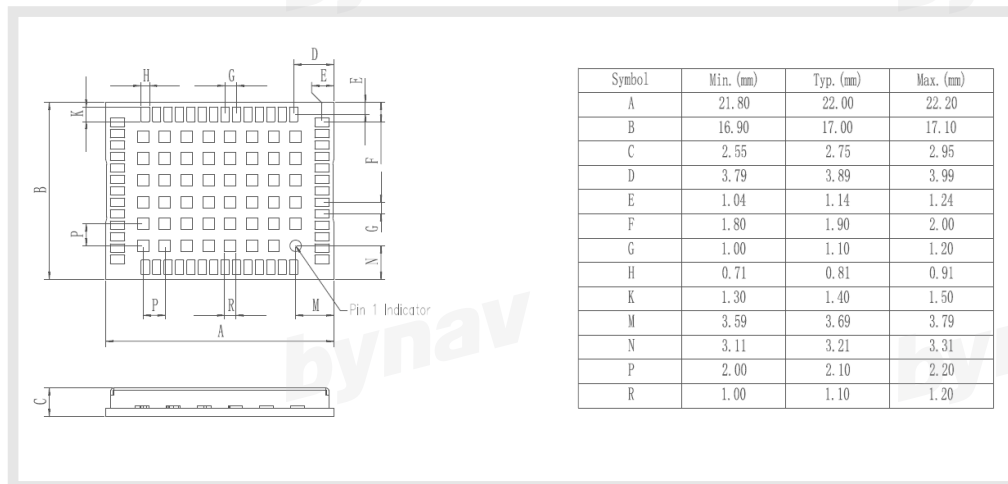
ISO 26262 ASIL B*

AEC-Q104*

Note:

1. Typical value. Performance will be affected by GNSS status, satellites' location, baseline length, multipath and other interference;
 2. Using 1 km baseline and the receiver with good antenna performance, without considering possible errors due to antenna phase center offset;
 3. Typical value. The time taken from power-on to the first output of a valid single-point position after clearing ephemeris/almanac/coarse position and time information.
 4. Typical value. The time taken from power-on to the first output of a valid single-point position when the receiver has stored valid ephemeris/almanac/coarse position and relatively accurate time information (with an error of less than 5 minutes). The special firmware supports a 3-second hot start, but the firmware not support the network port;
 5. -130dBm and more than 12 satellites are available;
 6. Open sky without any obstruction, 99% @ static;
 7. Optional. Bias caused by RF and antenna is not included;
 8. Typical value. Power of antenna and peripherals is not included;
 9. 10Hz is supported in special firmware;
 10. There is optional temperature range of -40°C ~105°C ;
 11. When odometer is connected and vehicle model is used.
- * Optional, supported in special firmware.

Mechanical Specification



More information, please refer to



www.bynav.com



Wechat Official Account

Please contact us for more information of products!

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Make Mobility More Intelligent