BS-IN570-M-D6EC High Precision Vehicle Integrated Navigation and Positioning Unit

Main features

- ASIL-D functional safety IMU
- High-performance self-developed Z-axis MEMS gyroscope
- -40 ℃ to + 85 ℃ full temperature calibration and compensation
- Software and hardware functional security design of IMU and combined navigation system
- Tightly coupled combination algorithm to improve positioning stability in harsh environment
- High-performance Z-axis gyroscope ensures the short-term navigation accuracy after the satellite is unlocked
- Vehicle navigation algorithm based on motion constraint
- Data fusion of multiple sensors such as external odometer
- Support multiple navigation modes of single antenna/dual antenna
- Small size, low weight and low power consumption
- It has the functions of software online upgrade and automatic calibration of parameters.

Technical features

Product accuracy/function can be customized

BS-IN570-M-D6EC high-precision vehicle integrated navigation and positioning unit is a real-time navigation and positioning unit developed by the company to meet the needs of passenger car assisted automatic driving. The integrated navigation and positioning module adopts a high-performance MEMS inertial sensor, a high-precision GNSS board card and a vehicle-mounted odometer to realize integrated navigation, and can output high-precision positioning, speed measurement and attitude information of a centimeter level in real time,The product can be used for passenger cars and unmanned vehicles with automatic driving or intelligent driving functions.

The core sensor of the product can be customized according to the needs of different projects. The functional safety IMU is used as the core sensor in the integrated navigation and positioning unit, in which the Z-axis (vehicle-mounted heading) gyroscope can be replaced by a higher precision sensor to further improve the pure inertial navigation accuracy after the GNSS signal is unlocked. A high-precision GNSS position module with an RTK function is adopted,It supports BDS B1/B2, GPS L1/L2, GLONASS L1/L2, GALILEO E1/E5b and other satellite signals, and supports single antenna positioning/dual antenna orientation and other configurations.

The product can be upgraded to a customized inertial navigation system through software, and can also be connected to other sensors to achieve multi-source integrated navigation.

Advanced technology, process and quality control

BS-IN570-M-D6EC high-precision vehicle integrated navigation and positioning unit adopts advanced technology in the process of device and system design and manufacturing, and is produced in strict accordance with vehicle regulation standards. At the same time, measures such as anti-shock and vibration design are adopted inside the unit to ensure that the product can accurately measure the position and attitude parameters of the carrier in harsh environment. The company implements ISO9001 quality system.Ensure the reliability and consistency of product performance.

Advanced algorithm and software design

At the IMU level, in addition to the selection of high-precision inertial sensors, the unit also carries out static error compensation (zero, scale factor, installation error, etc.), dynamic error compensation (coning error, rowing error compensation) and other technologies to ensure the

Table 1 Performance parameters of BS-IN570-M-D6EC high-precision vehicle integrated navigation and positioning unit

<table>
<tr><td rowspan="4">GNSS indicators</td><td>Signal tracking</td><td colspan="4">BDS：B1/B2；GPS：GPL1/L2；GLONASS：1/L2； GALILEO</td></tr>
<tr><td>Positioning accuracy</td><td colspan="4">RTK: horizontal 2cm + 1 ppm, elevation 3cm + 1 ppm</td></tr>
<tr><td>Orientation accuracy</td><td colspan="4">0.2 ° (1m baseline)</td></tr>
<tr><td>Data update rate</td><td colspan="4">1Hz、5Hz</td></tr>
<tr><td rowspan="5">Integrated positioning performance (integrated wheel speed)</td><td rowspan="2">Time</td><td colspan="2">Position accuracy (m)</td><td colspan="2">Velocity accuracy (m/s)</td></tr>
<tr><td>Level</td><td>Elevation</td><td>Level</td><td>Elevation</td></tr>
<tr><td>0s</td><td>0.02</td><td>0.03</td><td>0.02</td><td>0.01</td></tr>
<tr><td>10s</td><td>0.2</td><td>0.3</td><td>0.07</td><td>0.03</td></tr>
<tr><td>60s</td><td>2</td><td>3</td><td>0.2</td><td>0.1</td></tr>
<tr><td rowspan="2">Attitude accuracy</td><td>Orientation accuracy</td><td colspan="4">0.2 ° (integrated navigation), 0.1 ° (GNSS loosing lock for 60s)</td></tr>
<tr><td>Roll/pitch</td><td colspan="4">0.1° （RMS）</td></tr>
<tr><td rowspan="2">MEMS performance</td><td>Peg-top</td><td colspan="4">Range: ± 300 °/s; Zero-bias instability: ≤ 2 °/H
Z-axis (optional): ± 300 °/s; Zero-bias instability: ≤ 0.5 °/H</td></tr>
<tr><td>Accelerometer</td><td colspan="4">Range: ± 6 G; Zero-bias instability: < 50ug</td></tr>
<tr><td colspan="6">Physical dimensions</td></tr>
<tr><td colspan="2">Size</td><td colspan="4">(L x W x H): 100mm x 100 mm x 30 mm</td></tr>
<tr><td colspan="2">Weight</td><td colspan="4">250g</td></tr>
<tr><td colspan="6">Environmental characteristics</td></tr>
<tr><td colspan="2">Operating temperature</td><td colspan="4">-40℃ ～ +85℃</td></tr>
<tr><td colspan="2">Storage temperature</td><td colspan="4">-55℃ ～ +95℃</td></tr>
<tr><td colspan="6">Power requirements</td></tr>
<tr><td colspan="2">Voltage</td><td colspan="4">+9～+36VDC</td></tr>
<tr><td colspan="2">Power consumption</td><td colspan="4">≤8W</td></tr>
<tr><td colspan="6">Interface requirements</td></tr>
<tr><td colspan="2">GNSS RF Interface</td><td colspan="4">Antenna: FAKRA type C/D, 50Ω rated impedance</td></tr>
<tr><td colspan="2">Data input/output interface</td><td colspan="4">1-way 422, 1-way 232, 2-way CAN, 1-way PPS _ OUT</td></tr>
</table>

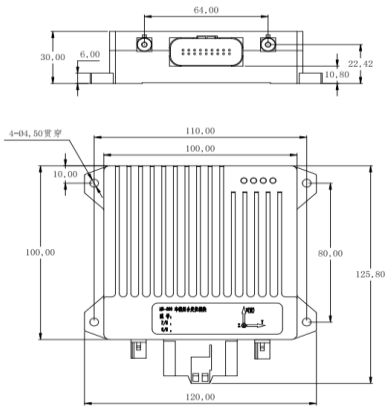

Fig. 1 Outline Structure Dimension Drawing

Pin	Definition	Pin	Definition
1	POWER(+12V)	10	RS422_TX+
2	PGND	11	RS422_TX-
3	CAN2_H	12	RS422_RX-
4	CAN2_L	13	RS422_RX+
5	PPS	14	SGND
6	SGND	15	RS232_TX
7	CAN1_H	16	RS232_RX
8	CAN1_L	17	RS232_GND
9	SGND	18	IGNITION