SALUKI
TECHNOLOGY

NS8350 series navigation signal source

Technical specifications

Saluki Technology Inc.

1. Product Introduction

The NS8350 series navigation signal source supports signal simulation of four satellite navigation systems, BDS/GPS/GLONASS/GALILEO, providing users with stable, reliable, accurate, and controllable GNSS simulation signals. It is a dedicated testing equipment for satellite navigation product development, testing, and certification. After selecting the relevant components, the NS8350 series navigation signal source can support signal simulation for special applications such as INS/GNSS combination, multiple antennas, and multiple users.

2. Product features

- Can generate BDS/GPS/GLONASS/Galileo multi system full frequency satellite navigation signals and SBAS satellite based enhancement system signals.
- For applications such as high-precision positioning and integrity monitoring, the NS8350 series has the ability to simulate special requirements such as signal quality anomalies, non ideal transmission and reception channels, complex multipath environments, and ionospheric dispersion effects.
- Cascading multiple devices can achieve large-scale signal simulation of multiple antennas or users, providing flexible solutions for personalized user needs.
- Support the expansion of different components on the basic hardware platform, with functions such as RTCM differential positioning, GNSS/INS integrated navigation, array antenna signal simulation, etc., to meet the research and testing needs of various navigation receiving terminals.

3. Product images

4. Application field

- Development and testing of navigation equipment;
- metrological verification;
- Adversarial simulation and training teaching;
- Various navigation simulations (aircraft, satellites, ships, cars, etc.

5. Functional characteristics

- Support all publicly available satellite navigation signals for BDS/GPS/GLONASS/GALILEO four systems;
- Support BDS authorization signal (authorization signal module requires user application);
- Supporting complete constellation and carrier control, ionospheric and tropospheric delay simulation;
- Support testing mode, multiple pseudorange models, such as stationary, constant speed, uniform acceleration, sine, circumference, etc;
- Supports various typical user dynamics, including uniform speed, uniform acceleration, sine, and circular motion;
- Support ship, vehicle, aircraft, and spacecraft models;
- Support importing external trajectory files;
- Support external trajectory data injection;
- Support data recording, including carrier data, satellite data, signal data, navigation messages, and ephemeris information;

- Supports data output, including carrier data and satellite data, can output simulation data in real-time through Ethernet interface, can be remotely controlled, and facilitates system integration of navigation signal sources;
- Supports multiple standard input and output data formats: RINEX format ephemeris, YUMA format almanac, etc;
- Support multipath signal simulation;
- Supports multi antenna or multi-user simulation, with a maximum of 3 users per machine (optional);
- Support RTCM differential positioning simulation (optional);
- Support INS/GNSS combination navigation (optional).

6. Performance indicators

6.1. Signal type

BDS: B1I、B1C、B2a、B2b、B3I and authorization signals;
GPS: L1C/A、L1C、L1P、L2C、L2P、L5;
GLONASS: L1、L2;
GALILEO：E1、E5a、E5b;
QZSS：L1C/A、L1C、L2C、L5（Optional）;
IRNSS：L5、S（Optional）;
SBAS：L1、L5.

6.2. Number of signal channels

BDS：18;
GPS：18;
GNOLASS：12;
GALILEO：18;
SBAS：16.

6.3. Number of multipath channels per frequency point

4.

6.4. Signal dynamic parameters

maximum height：≥100km;
maximum speed：±200000m/s;
Speed resolution：≤0.01m/s;
Maximum acceleration：±10000m/ s^2;
Acceleration resolution：≤0.01m/s^2;

Maximum acceleration speed：±15000m/ s^3;

Jerk acceleration：≤0.01m/s^3.

6.5. Phase noise

-80dBc/Hz@100Hz；

-85dBc/Hz@1kHz；

-90dBc/Hz@10kHz；

-105dBc/Hz@100kHz；

6.6. Signal accuracy

Pseudorange phase error：±0.03m；

Pseudo range rate of change error：±0.003m/s；

Consistency between code phase channels：≤0.3ns.

6.7. Signal quality

Clutter suppression (in band)：≤-50dBc；

Harmonic suppression (secondary)：≤-50dBc.

6.8. Signal level

power range：-100dBm ~-20dBm；

Power absolute error：≤0.5 dBm；

power resolution：≤0.2dB；

Power linearity：≤1dB.

6.9. Time frequency benchmark

Frequency stability：≤5×10^{-11}/s；

Frequency accuracy：≤5×10^{-8}.

6.10. Power supply characteristics

Input voltage：（220±10%）VAC；

Frequency range：（50±10%）Hz；

consumption：≤120W.

6.11. Environmental adaptability

Working temperature and humidity：temperature：-20℃~+45℃

humidity：10%~95%；

Storage temperature and humidity：temperature：-40℃~+85℃

humidity：10%~95%；

6.12. Interface

Interface Name	Type	characteristic
RF OUTPUT	N（F）	Impedance 50Ω -100dBm~-20dBm
10M clock input	BNC（F）	impedance50Ω 7 dBm±2dBm
10M clock output	BNC（F）	impedance50Ω 7 dBm±2dBm
1PPS input	BNC（F）	impedance50Ω TTL level
1PPS output	BNC（F）	impedance50Ω TTL level
Serial port	DB9	UART RS232
gigabit ethernet	RJ45	10M/100M/1000M self-adaption

6.13. Physical properties

size：Standard 3U chassis，48.2cm×53.7cm×13.4cm；

weight：≤14.5kg.

7. Delivery Checklist

Serial Number	name	describe	number
1	Navigation signal source	device host	1
2	Simulation control software	light disk	1
3	power line	Three hole power cord, 1.8m	1
4	attenuator	30dB、40 dB 1 each	2
5	operation instructions	Equipment operation instructions	1
7	Factory test report	Factory test certificate of conformity	1
8	Certificate of conformity	qualification certificate of products	1

8. Product standards

GBT-39413-2020- Performance requirements and testing methods for signal simulators of Beidou satellite navigation systems.

9. Typical Applications

The signal level testing environment built from the navigation signal source as the core is the core of the detection center, mainly detecting the navigation, positioning, and timing functions of the tested object. The navigation signal source can provide various navigation signals required for testing, and the detection methods are divided into wired and wireless according to the testing connection method..

9.1. Satellite navigation wired testing system

The satellite navigation wired testing system uses navigation simulation sources to generate satellite navigation signals in different working environments. Through wired injection, the performance of the tested equipment in different scenarios is tested and verified. This system has advantages such as repeatable testing, controllable signal, configurable errors, customizable scenarios, and quantitative evaluation of results.

9.2. Satellite Navigation Wireless Testing System

The satellite navigation wireless testing system takes the navigation signal source as the core, and verifies and tests the tested equipment by building a complete integrated testing environment. The navigation signal is transmitted through an antenna and can be paired with a turntable to provide different elevation tests for the tested object. Can simulate and simulate real wireless environment navigation signals to the greatest extent possible, achieving accurate and controllable signals.