GSG-55

GPS 16-channel simulator

pendulum

- **Versatile 16-channel GPS signal generator with pre-configured test scenarios**
- **SBAS (WAAS, EGNOS) simulation**
- **Configurable multipath simulation**
- **White noise generator for receiver SNR testing**
- **Easy-to-use and intuitive**
- **Fully operational via front-panel**
- **Multiple interfaces for remote control**
- **Affordable and powerful**

The NEW Pendulum GSG-55 is a GPS constellation simulator that expands on the set of features of the popular GSG-54, adding 16-channel simulation, SBAS simulation and white noise generation. These new features make the GSG-55 capable for in-line production testing, including navigational fix and position testing, for engineering and development of even more applications than the GSG-54.

Easy to Use

The GSG-55 user can configure scenarios on-the-fly without the need for external PC and pre-compilation phase. Via the front panel the user can swiftly modify parameters such as user position, time and specify output powers in carrier to noise ratio instead of absolute output power. Utilizing the white noise generation extends the usability and flexibility.

Flexibility

The GSG-55 16-channel simulator makes it possible to simulate all the visible satellites for the receiver under test. In addition other channels can be used for SBAS simulation of EGNOS or WAAS satellites, or for simulating multipath.

GSG-55 is shipped with several multipath scenarios where the receivers' response to an increased multipath environment can be analyzed. It also has a set of trajectories (static, circles, rectangular according to 3GPP TS 25.171) that allows the user to upload their own trajectories in NMEA standard format. The user can upload their own ephemeris data in standard RINEX format or re-use the default data for any time periods. GSG-55 can even automatically download historical RINEX, WAAS and EGNOS data from official ftp sites, as needed. GSG-55 has USB, GPIB as well as Ethernet interface, allowing remote control via network connection.

Suitable for Testing Timing Receivers

Besides the variety of built-in navigation/positioning tests, the GSG-55 is also suited for accurate testing of timing GPS-receivers. The GSG-55 can be equipped with an ultra-high-stability OCXO timebase for precision timing of the satellite data, or use external synchronization from a 10 MHz reference from e.g. a Cesium or Rubidium clock. A built-in 1-pps output, synchronized to the generated satellite data, allows comparison with the 1-pps signal from the timing receiver under test.

The Affordable Test Solution

The GSG-55 is a perfect fit for a wide-variety of test cases including:

- Test of simulated movements (user trajectories).
- Test of receivers' sensitivity to loss of satellites, multi-path, leap seconds, and atmospheric conditions.
- Fast production test of connectivity and sensitivity (conducted or over-the-air).
- Production test of positioning receivers' accuracy.
- Test of timing receiver accuracy.
- Test of receivers' dynamic range.
- Test of receivers' susceptibility for noise (SNR limit testing).

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Input and Output Specifications

RF Signal GPS L1

Connector: Type N female
Frequency: 1575.42 MHz (L1)
Number of output channels: 16
Channel configuration:
16 GPS satellites
Up to 3 WAAS or EGNOS satellites (instead of 1-3 GPS satellites)
White noise channel
Data format:
50 bits/s, GPS frame structure
250 bits/s, SBAS
PRN codes: 1 to 210
Spurious transmission: <-40 dBc
Harmonics: <-40 dBc
Output signal level: -65 to -160 dBm;
0.1 dB resolution down to -150 dBm;
0.3 dB down to -160 dBm.
Power accuracy: ±1.0 dB
Pseudorange accuracy: 1mm
Inter-channel bias: Zero
Inter-channel range: >54 dB
Altitude limit: 60,000 feet (18,240 m)
Velocity limit: 515 m/s (1000 knots)
White noise signal level: -47 to -160 dBm
0.1 dB resolution down to -150 dBm;
0.3 dB down to -160 dBm.
±1.0 dB accuracy

External Frequency Reference Input

Connector: BNC female
Frequency: 10 MHz nominal
Input signal level: 0.1 to 5Vrms
Input impedance: >1kΩ

Frequency Reference Output

Connector: BNC female
Frequency: 10 MHz sine
Output signal level: 1Vrms in to 50 Ω load

1PPS Output

Connector: BNC female
Output signal level:
approx. 0V to +2.0V in 50 Ω load

Built-in Timebase

Internal Timebase – Standard OCXO

Ageing per 24 h: $<5x10^{-9}$
Ageing per year: $<2x10^{-7}$
Temp. variation 20...26°C: $<2x10^{-8}$
Short term stability (Adev @1s): $<1x10^{-10}$

Internal Timebase – Optional Ultra-High-Stability OCXO

Ageing per 24 h: $<3x10^{-10}$
Ageing per year: $<1.5x10^{-8}$
Temp. variation 20...26°C: $<2.5x10^{-9}$
Short term stability (Adev @1s): $<5x10^{-12}$

Auxiliary Functions

Interface

GPIB, USB (USB-TMC-488),
Ethernet (100/10 Mbps)

Settings

Predefined scenarios: 12;
User can change date, time, position, trajectory, no of satellites, satellite power level and atmospheric model
User defined scenarios: Unlimited

General Specifications

Certifications

Safety: Designed and tested for Measurement Category I, Pollution Degree 2, in accordance with EN/IEC 61010-1:2001 and CAN/CSA-C22.2 No. 61010-1-04 (incl. approval)
EMC: EN 61326-1:2006, increased test levels per EN 61000-6-3:2001 and EN 61000-6-2:2005

Dimensions

WxHxD: 210 x 90 x 395 mm
(8.25" x 3.6" x 15.6")
Weight: approx. 2.7 kg (approx. 5.8 lb)

Optional Antenna

Frequency: 1575.42 ±2MHz
Impedance: 50 Ω
VSWR: <2:1 (typ)

Op. Temperature: -40° to +85°C
Connector: SMA male
Dimensions: 12 mm diameter x 38 mm length

Environmental

Class: MIL-PRF-28800F, Class 3
Temperature: 0°C to +50°C (operating); -40°C to +71°C non-condensing @ <12,000 m (storage)
Humidity:
5-95 % @ 10 to 30°C
5-75 % @ 30 to 40°C
5-45 % @ 40 to 50°C

Power

Line Voltage: 90-265 Vrms, 45-440 Hz
Power Consumption: <25 W

Ordering information

Basic Model

GSG-55: GPS 16-channel simulator; with standard OCXO timebase
Included with instrument
User manual on CD
File loader PC software for Windows XP/2003/Vista/7/2008
RF cable, 1,5 m
USB cable
Certificate of calibration
18 months warranty

Built-in Options

Option 40/54: Ultra-high-stability OCXO instead of standard OCXO

Optional Accessories

Option 01/70: Helix Antenna
Option 22/90: Rack-mount kit
Option 27: Soft carrying case
Option 27H: Heavy-duty hard transport case
Option 90/54: Calibration Certificate with Protocol
Option 95/03: Extended warranty to 3 years
Option 95/05: Extended warranty to 5 years
OM-54: Users manual (printed)

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