GSG-54

GPS 8-channel Simulator

pendulum

- **Versatile 8-channel GPS signal generator with pre-configured test scenarios**
- **Easy-to-use and intuitive**
- **Fully operational via front-panel**
- **Multiple interfaces for remote control**
- **Stand-alone, compact and portable bench-top chassis**
- **3GPP A-GPS Standards-based testing**
- **Affordable and powerful**

The GSG-54 is a GPS Constellation Simulator that expands on the features available with the GSG-L1 one-channel GPS signal generator without the complexity and cost of other multi-channel GPS simulators. The GSG-54 provides a wide-range of capabilities for in-line production testing, including navigational fix and position testing, while offering ease-of-operation and extremely fast test cycles. It also benefits engineering and development organizations for integrating GPS receivers into their devices.

Easy to Use

The easy-to-use GSG-54 is an 8-channel GPS constellation simulator. The user can configure scenarios on-the-fly without the need for external PC and without pre-compilation phase. Using the front panel the user can swiftly modify parameters such as user position and time and can define the scenario through a set of pre-defined antenna and atmospheric models, as well as trajectories and events.

Flexibility

GSG-54 comes with built-in support for multipath simulation and a set of trajectories (static, circles, rectangular according to 3GPP TS 25.171) and 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-54 can be controlled via a network connection over Ethernet. A USB and GPIB interface is also available.

Suitable for Testing Timing Receivers

Besides the variety of built-in navigation/positioning tests, the GSG-54 is also suited for accurate testing of timing GPS-receivers. The GSG-54 can be equipped with an ultra-high-stability OCXO timebase for precision timing of the satellite data, and to emulate the actual atomic clocks in the satellites, there is an input for external synchronization from a 10 MHz reference from e.g. a Cesium or Rubidium clock. A built-in 1-pps output, which is 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-54 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, 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.

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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: 8
Data format/Frame structure: 50 bps (GPS C/A code)
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)
Acceleration limit: 4.0 g
Velocity limit: 515 m/s (1000 knots)
Jerk limit: 20 m/s^3

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

Settings

Predefined scenarios: 6;
User can change date/time/position/trajectory/no of satellites/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 @ <12,000m (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-54: GPS 8-channel simulator; with standard OCXO timebase
Included with instrument
User manual on CD
PC control program 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: 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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