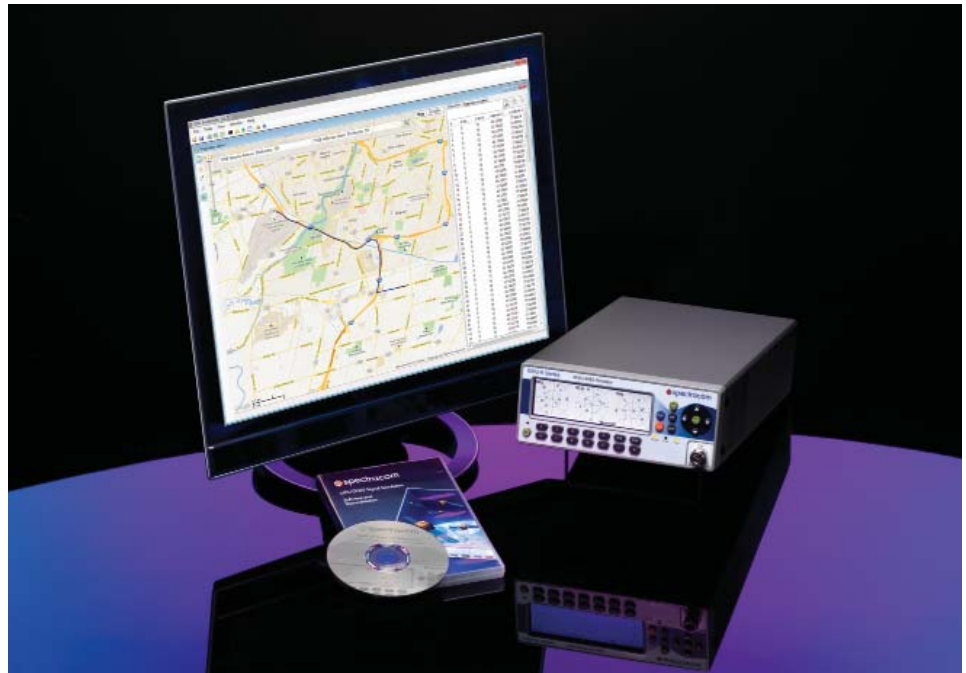


# GSG-6 Series

## Advanced Multi-Frequency GNSS Simulator



- **Advanced multi-frequency GNSS RF signal generator**
- **Supports all signals in the L1 band: GPS, GLONASS, Galileo E1, BeiDou B1, QZSS**
- **Supports testing dual frequency (L1/L2) receivers and SAASM with pseudo P(Y)**
- **Also supports new GPS signals L2C, L5; GLONASS L2; Galileo E5; BeiDou B2; IRNSS L5**
- **Pre-configured, or user-edited or easily built test scenarios**
- **Test the dynamic capability of a receiver through powerful trajectory capabilities**
- **Standalone operation with front panel controls, or full remote control via various interfaces**
- **Compact and lightweight**
- **Test virtually any impairment to GNSS signal acquisition: multi-path, interference, jamming, atmospheric effects**
- **Modular hardware and software design allows full upgradeability to accommodate new requirements**



The GSG-6 Series family offers multiple frequency band operation, multiple GNSS constellation simulation, and expansion to many more channels. Incorporating all of the features of the popular 5 Series family, the 6 Series line expands your capability to simulate all the new, emerging GNSS signals. With a base of 32 channels, upgradable to 48, 64, or more, it provides navigational fix and position testing, for engineering and development testing. The Series 6 simulator protects your investment by being upgradeable in the future to more frequency bands and channels (plug-in hardware upgrade) and more signal formats (firmware upgrade).

### Easy to Use

The GSG-6 Series user can configure scenarios on-the-fly without the need for an 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. And using the optional StudioView™ software facilitates easily created scenarios via a Google Maps interface.

### Flexibility

The GSG-6 Series multi-channel simulator makes it possible to simulate all the visible satellites for the receiver under test. With up to 64 channels available, these channels can be assigned to

any GNSS constellation, any particular signal. Or some of these channels can be used for SBAS simulation of EGNOS, WAAS, GAGAN, or MSAS satellites, or for simulating multipath or interference. If more channels are required, simply synchronize two or more units via an external sync signal to generate 128, 256, or more channel simulation.

GSG-6 Series is shipped with several multipath scenarios where the receivers' response to an increased multipath environment can be analyzed. It also has a set of built-in trajectories (static, configurable circle, and rectangular as defined in 3GPP TS 25.171) or the user can 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. The GSG-Series 6 can even automatically download historical RINEX, WAAS and EGNOS data from official websites, as needed.

### Connectivity Extends Ease of Use and Flexibility

The GSG-6 Series can be controlled via an Ethernet network connection, USB or GPIB. A built-in web interface allows complete operation of the instrument through front panel controls. With the optional GSG StudioView™ PC Software, you can build, edit, and manage the most complex scenarios, including building trajectories via Google Maps, independent of the GSG unit, for later upload.

## Suitable for Testing Timing Receivers

Besides the variety of built-in navigation/positioning tests, the GSG-6 is also suited for accurate testing of timing GNSS-receivers. The GSG-6 is 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-6 is a perfect fit for a wide-variety of test cases including:
- Testing of military SAASM receivers and high-end survey grade civilian receivers.
- 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 sensitivity and positioning receivers' accuracy (conducted or over-the-air).
- Test of timing receiver accuracy.
- Test of receivers' dynamic range.
- Test of receivers' susceptibility for noise (SNR limit testing).
- Test of leap second transition.

## Input and Output Specifications

### RF Signal GNSS Multi-Frequency

**Connector:** Type N female

**Frequency:** L1/E1/B1/SAR: 1539 – 1627 MHz;  
L2/L2C: 1167 – 1255 MHz;  
L5/E5/B2: 1146 – 1234 MHz;  
E6/B3: 1215 – 1303 MHz

**Number of output channels:** 32, 48 or 64; Channel configuration: Any channel can be configured to any constellation; Any channel bank of 16 channels can be configured to any of the four frequency bands

**Constellations:** GPS, GLONASS, Galileo, BeiDou, QZSS, IRNSS

**Modulations:** BPSK, QPSK, BOC (all)

**SBAS:** WAAS, EGNOS, GAGAN, MSAS, SAIF

**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:**

Within any one frequency band: 1 mm;

Across different frequency bands: 30 cm

**Inter-channel bias:** Zero

**Inter-channel range:** >54 dB

Limits:	Standard	Extended
<b>Altitude</b>	18,240 m (60,000 feet)	20,200,000 m (66,273,000 feet)
<b>Acceleration</b>	4.0 g	No limits
<b>Velocity</b>	515 m/s (1000 knots)	20,000 m/s (38,874 knots)
<b>Jerk</b>	20 m/s <sup>3</sup>	No limit

**White noise signal level:** -50 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

### External Trigger Input

**Connector:** BNC female

**Frequency:** TTL level, 1.4V nominal

### 1PPS Output

**Connector:** BNC female

**Output signal level:** approx. 0V to +2.0V  
in 50 Ω load

**Accuracy:** Calibrated to ±10 nSec of RF timing mark output

## Built-in Timebase

### Internal Timebase – High Stability OCXO

**Ageing per 24 h:** <5x10<sup>-10</sup>

**Ageing per year:** <5x10<sup>-8</sup>

**Temp. variation 0...50°C:** <5x10<sup>-9</sup>

**Short term stability (Adev @1s):** <5x10<sup>-12</sup>

## Auxiliary Functions

### Interface

GPIO (IEEE-488.2), USB 1.X or 2.X (USBTMC-488), Ethernet (100/10 Mbps)

### Settings

**Predefined scenarios:** User can change date, time, position, trajectory, number of satellites, satellite power level and atmospheric model

**User defined scenarios:** Unlimited

**Trajectory data:** NMEA format (GGA or RMC messages, or both), convert from other formats with GSG StudioView™ (see separate datasheet)

## 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:** 1000 - 2600MHz

**Impedance:** 50 Ω

**VSWR:** <2:1 (typ)

**Connector:** SMA male

**Dimensions:** 15 mm diameter x 36 mm length

### Environmental

**Class:** MIL-PRF-28800F, Class 3

**Temperature:** 0°C to +50°C (operating); -40°C to +70°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:**

Model GSG-62: <25 W

Model GSG-64: <40 W

## Ordering Information

### Models

**GSG-62:** L1+Additional Simultaneous Frequency, Multi-constellation 32-channel simulator; with standard OCXO timebase

**GSG-63:** L1+ Two Additional Simultaneous Frequencies, Multi-constellation 48-channel simulator; with standard OCXO timebase

**GSG-64:** L1+ Three Additional Simultaneous Frequencies, Multi-constellation 64-channel simulator; with standard OCXO timebase

### Included with instrument

- User manual and GSG StudioView software (one license per unit) on CD
- RF cable, 1.5 m
- SMA to Type N adapter
- USB cable
- Certificate of calibration
- 3-year warranty<sup>1</sup>

### Optional Accessories

**Option 01/71:** Passive GNSS Antenna

**Option 22/90:** Rack-mount kit

**Option 27H:** Heavy-duty hard transport case

**OM-54:** User Manual (printed)

Additional StudioView licenses are available

### Optional Upgrades

**Option GLO:** GLONASS Constellation

**Option GAL:** Galileo Constellation

**Option BDS:** BeiDou Constellation

**OPT-QZ:** QZSS Constellation

**OPT-IRN:** IRNSS Constellation

**Option L2:** Frequency Option L2

**Option L2C:** Frequency Option L2C

**Option L5:** Frequency Option L5

**Option 48/3<sup>2</sup>:** 48 channel, three-frequency upgrade (GSG-62 to GSG-63)

**Option 64/4<sup>2</sup>:** 64 channel, four-frequency upgrade (GSG-63 to GSG-64)

**OPT-JAM:** Jamming

**OPT-RTK:** RTK Virtual Base Station

**Option RSG:** Real-time Scenario Generator (requires 16 channel configuration)

**Option HV:** High Velocity Upgrade (requires 16 channel configuration)

**Option RP:** Record and Playback (requires 16 channel configuration)

### Optional Services<sup>1</sup>

**Calibration/GSG:** GSG Calibration Service

**OPT-TIM:** Timing Calibration Service

**Option 95/05:** Extended warranty to 5 years

**GSG-ASP:** GSG Annual Service Plan

**GSG-INST:** User Training and Installation

<sup>1</sup>The warranty period and available services may vary dependent on country.

<sup>2</sup>Option may require the unit to be returned to factory for upgrade