



GSS8000 SERIES

GNSS Constellation Simulator

Capability, flexibility & fidelity in GNSS simulation

GSS8000

Highlights of the GSS8000 series

The GSS8000 series has been designed to meet all the demanding requirements of research and development teams involved in satellite navigation and positioning systems. Due to its modular design, the GSS8000 can be readily adapted to the requirements of different applications. Up to 3 RF carriers, selected from a range of constellations and signals, can be accommodated in a single signal generator chassis.

A GSS8000 system comprises a controller computer running Spirent's powerful simulation software SimGEN and a signal generator configured to meet specific test needs. Multiple chassis can be combined to form an integrated, coherent signal generator if more signals or outputs are required. An extensive range of system extensions allows users to tailor their system to their specific needs, today and in the future.

Multiple Signals Combined

- Up to 3 carriers in a single chassis
- GPS, GLONASS, Galileo, QZSS and SBAS supported
- Architecture supports future Compass signals
- Open and encrypted signals available
- Up to 48 channels in a chassis plus up to 192 additional programmable multipath channels (total 240 channels per chassis)
- One or two RF outputs per chassis

Comprehensive Modelling

- Extensive multipath modelling
- Antenna gain and phase pattern
- Lever arm effects modelled
- Ionosphere and Troposphere modelling
- DGPS corrections
- Pseudorange ramps for RAIM testing
- ISCN support

Unmatched Pedigree and Support

- Regional support centre network
- E-mail, online and telephone support
- Regular software upgrades
- Knowledge base and on-line tracking system
- Every system includes deep and comprehensive features from over 25 years of GNSS testing experience
- Application notes and test methodologies



Complete Control

- Complete constellation and vehicle control
- Extensive motion and propagation models
- Highly flexible, with full defaults and error models
- Trajectory from internal vehicle models, from file or real-time external source
- Start / stop on external event trigger

Extensions and Options

- IMU and EGL testing: SimINERTIAL
- Barometric aiding: SimBARO
- Classified testing (e.g. MUE) with AES M-Code or SDS: SimMCODE, SimSAAS (US), SimCLASS
- Jammer and interference emulation: GSS7765
- GBAS and LAAS testing: GSS4150
- Automotive In Vehicle Navigation System (IVNS) testing: SimAUTO

The Spirent Advantage

With experience amassed over twenty-five years of supporting GNSS development, Spirent is your best choice for comprehensive performance and support.

Spirent offers:

- Comprehensive features as standard, built up over 25 years of development
- High fidelity simulation across the full dynamic range
- Top quality systems, backed by regional support network
- An assurance of continued investment in new GNSS technologies and systems
- Most variants available as standard “COTS” commercial systems
- Tailored solutions available to support special applications and configurations

Current and future needs can be met with the expandable GSS8000 series. Invest with confidence in a changing world, knowing that your GSS8000 system can grow as your GNSS test needs evolve.

Standard features enabled by SimGEN include simulation of multipath reflections, terrain obscuration, antenna reception gain patterns, differential corrections, trajectory generators for land, air, sea and space vehicles and comprehensive error generation and system modelling. Also supplied as standard is a low-latency, high-rate hardware-in-the-loop capability.

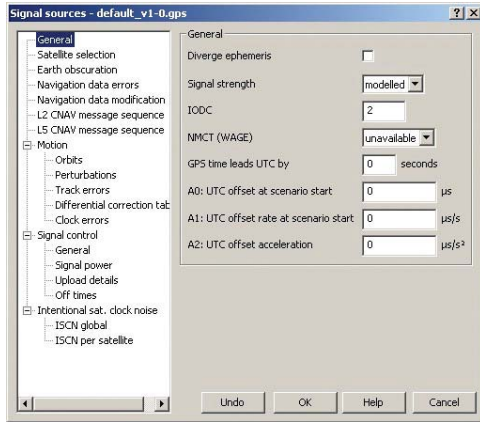
Flexibility and Connectivity

- Comprehensive API for remote control
- Real time data streaming aids analysis
- Supports hardware in the loop testing
- 1pps and 10MHz reference

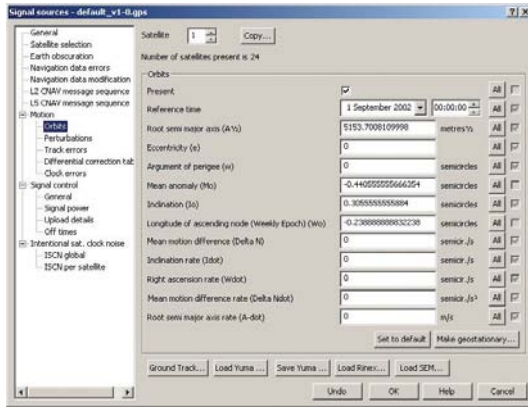
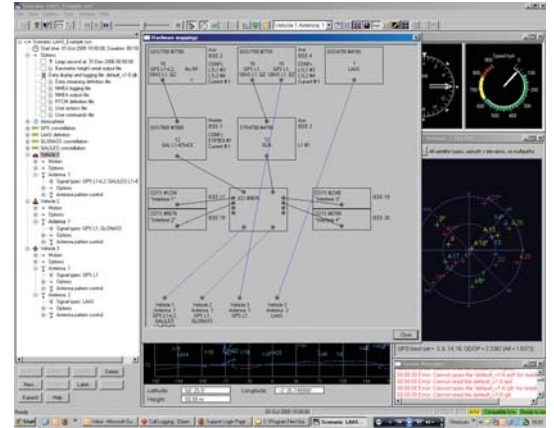


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GNSS Constellation Simulator



Comprehensive constellation editor



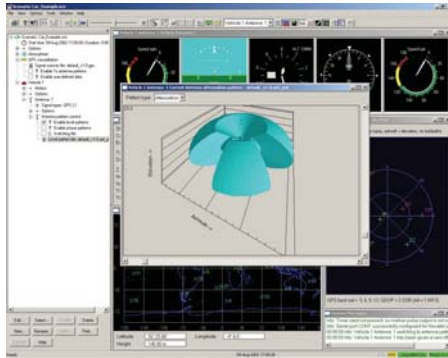
Import or define orbits



Comprehensive Modelling

Standard capabilities enabled through SimGEN include simulation of atmospheric effects, multipath reflections, terrain obscuration, antenna reception gain and phase patterns, differential corrections, trajectory generation for land, air, sea and space vehicles and comprehensive error generation.

An easy to use Graphical User Interface (GUI) allows modification of a wide range of variables from pre-set defaults, enabling the user to focus their time on the areas of test important to them. Complete scenarios are readily shared between systems, supporting collaborative activities and speeding the R&D cycle.



Flexible vehicle models

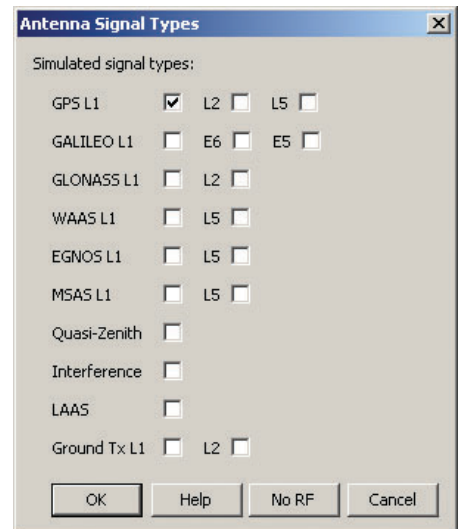
Complete Control

SimGEN works in real-time, compiling the required data stream that drives the RF signal generator and on-screen displays.

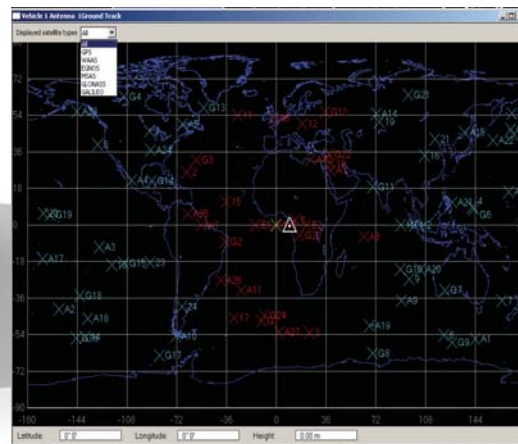
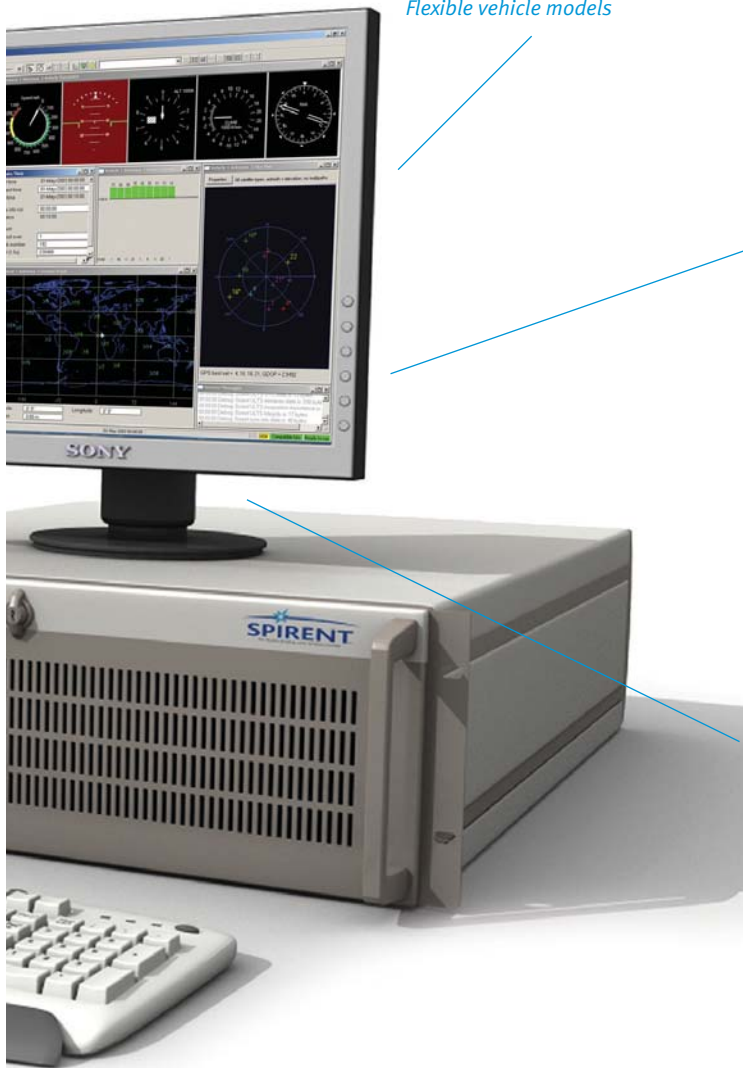
During scenario run, the user has extensive, interactive access allowing changes to predefined conditions. These 'User Actions' are recorded to a script file to aid post-run analysis or to allow the same actions to be replayed in subsequent runs of this or other simulations.

Data generated during scenario run-time may be displayed or saved to a file for subsequent analysis.

Also incorporated as standard is a low-latency, high-rate remote control capability permitting the use of external sources for trajectory enabling testing within control loops.



Simple signal selection



GNSS/SBAS constellations modelled

Multiple Signals Combined

Whether testing with multiple signals from a single constellation or testing hybrid systems with signals from multiple constellations, the GSS8000's modular design can be configured to meet your needs.

GSS8000 systems are pre-configured to your requirements from combinations of the following signals:

Key features:

- GPS:** L1, L2, L5; C/A, L1C, L2C, P, Pseudo-Y, M-Noise Y, AES M-Code, SDS M-Code*
- Galileo:** E1, E5ab, E6; OS, CS, SOL, PRS*
- GLONASS:** L1, L2; C/A, P
- SBAS:** WAAS, WAAS L5, EGNOS, MSAS
- QZSS:** L1 C/A, L1 SAIF

* Available to authorised users only

Your GSS8000 can be subsequently upgraded to meet your evolving test needs.

Extensions and Options

Increasingly, GNSS receivers and sensors do not operate in isolation. If development and verification testing of integrated systems is required then it is essential that other sensors are emulated and other signals are reproduced coherent with the GNSS signals.

The GSS8000 has been designed to operate with all of Spirent's extensive range of options and system extensions. For example: Inertial sensors can be emulated by SimINERTIAL. Wheel tick sensors and VSS signals are reproduced by SimAUTO. Noise and channel interference can be reproduced by the GSS7765. LAAS VDB broadcasts are produced by the GSS4150. In all cases, coherent control is achieved via Spirent's SimGEN software suite.



SimINERTIAL*: Operational performance of an Integrated GPS/ Inertial (IGI) system can be established in the laboratory using real-time emulation of the inertial sensor outputs along with a GSS8000 constellation simulator. All signals are coherently generated to exactly match the simulated vehicle trajectory. Typical inertial sensor performance can be represented by a sensor error model driven by the simulated motion, with appropriate coefficients entered by the user.

SimMCODE / SDS M-Code*: The GSS8000 series supports AES M-Code testing with SimMCODE and SDS M-Code testing via the SDS extension to SimMCODE.

SimCLASS / SimSAAS*: Provides SA/A-S simulation for testing of SAASM equipment using customer furnished AOCs.

* Available to authorised users only (applies to some SimINERTIAL variants)

SimAUTO: SimAUTO provides a turnkey solution to testing integrated vehicle navigation systems comprising GPS and Dead Reckoning (DR) sensors such as gyros or wheel ticks. SimAUTO allows parameters such as vehicle geometry and odometer pulse rate to be set and saved to a vehicle personality file for future use.

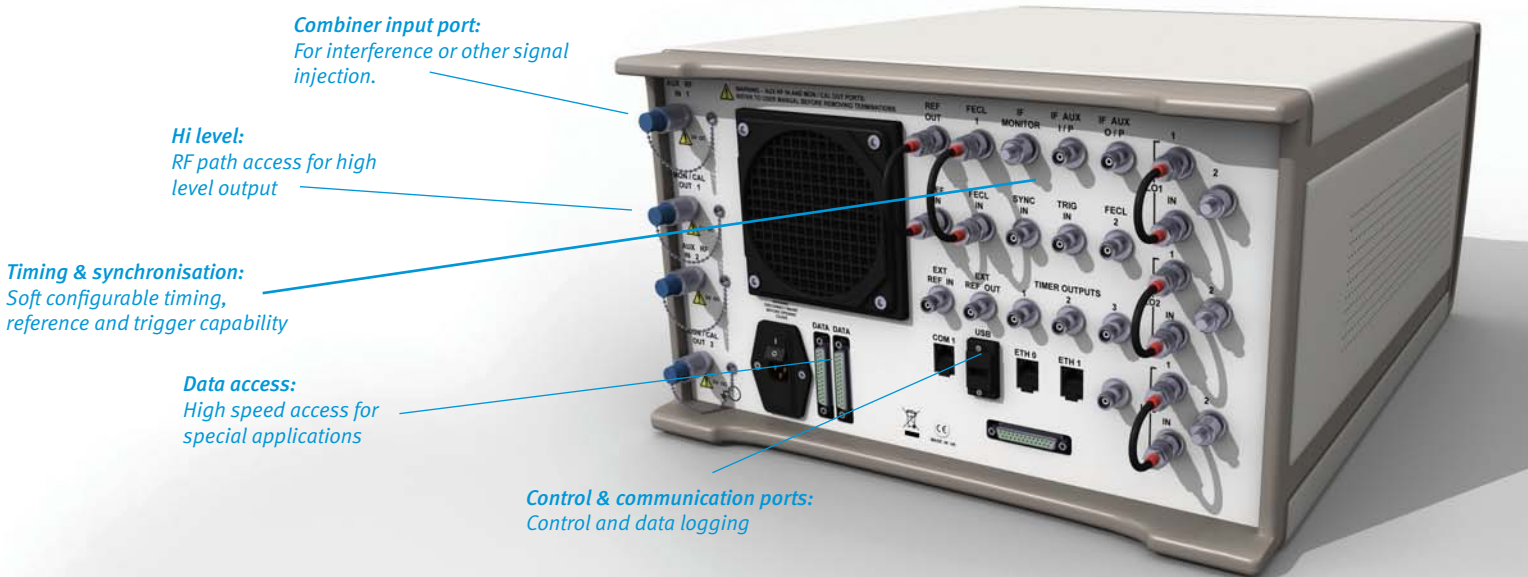
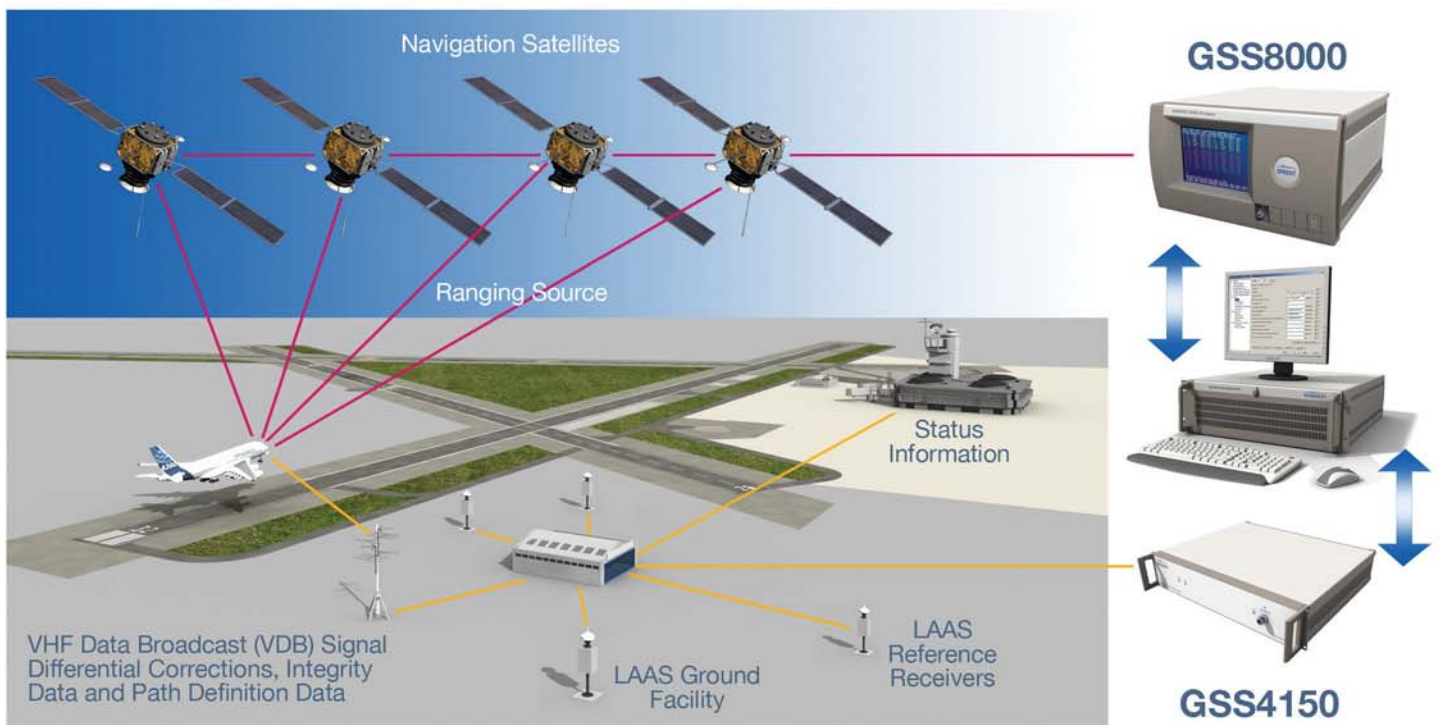
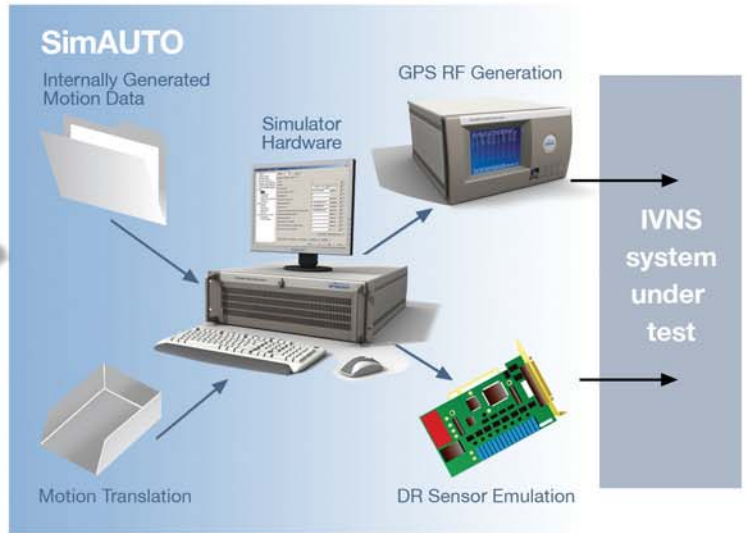
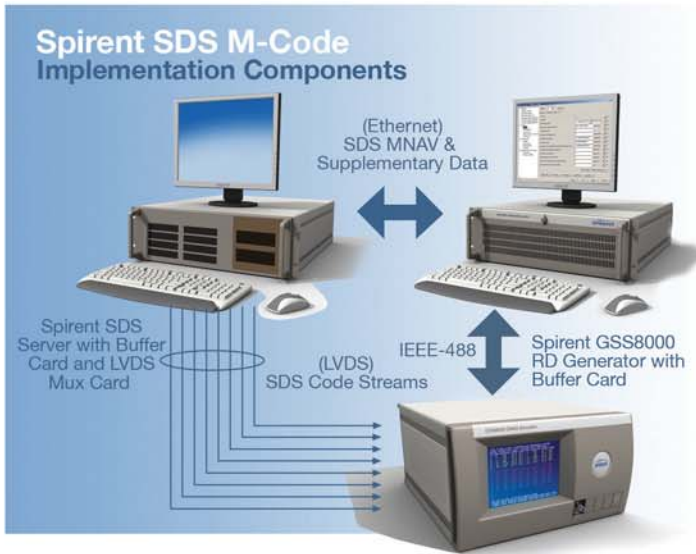
GSS7765: The GSS7765 offers a very broad range of interfering signal options, which may be used to represent a varied array of threat sources. The GSS7765 also supports noise generation with variable bandwidth and can be configured to support up to 4 fully independent interference sources.

SimREMOTE: Extends the GSS8000's comprehensive native remote control facility to include GPIB and SCRAMNet in addition to Ethernet.

GSS4150: The GSS4150 VDB simulator has been designed to provide an integrated source of the VHF data broadcast element of GBAS, such as LAAS. The data messages are constructed in real time using error modelling applied to a simulated GPS reference receiver and fixed data entered by the user. The GSS4150 varies the signal level in response to the distance of separation from the defined simulated transmitter location and the simulated aircraft position, and in response to the simulated VHF antenna reception pattern.

Flexibility and Connectivity

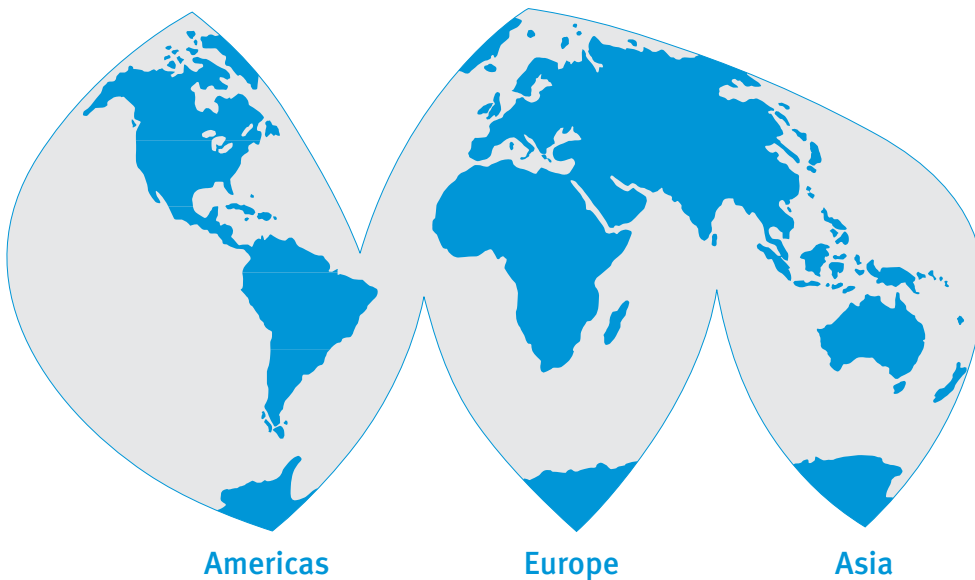
The GSS8000 is designed for the real-world testing environment with a wide range of interfaces both analogue and digital. Low level RF outputs are supplemented by high level RF inputs and outputs for monitoring and signal injection purposes; a range of digital interfaces include IEEE-488, Ethernet, SCRAMNet+ and SCRAMNet GT; extensive timing, trigger and control access.



Documentation and Reference Table

Related Product, Option or System Extension	Brochure Title	Data-sheet / Specification Ref.
GSS8000	GSS8000 Series	MS3057
SimGEN	SimGEN	MS3008
SimINERTIAL	SimINERTIAL	MS3030
SimBARO	SimINERTIAL	MS3056
SimAUTO	SimAUTO	MS3023
SimDATA	SimINERTIAL	MS3034
SimPRS		MS3042
SimCLASS	Classified Testing	MS3020
SimMCODE	Classified Testing	MS3018
SimREMOTE		MS3015
GSS7765	GSS7765	MS3055
GSS4150		MS3014

Global coverage



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