# Spirent **8100 Mobile Device Test System**

## GNSS Over-the-Air Test Solutions

Spirent's GNSS Over-the-Air (OTA) test solutions for GSM, UMTS, CDMA, LTE, and 5G NR devices automate the CTIA-defined OTA Test Plan and CCSA-defined GNSS Test Plan while also providing the customization capability needed for R&D testing. With a wide range of OTA test options, the solutions provide seamless integration with radiated testing hardware.

### Applications

#### Test Labs

- Testing to the CTIA OTA Test Plan, including A-GPS, A-GLONASS, A-GPS L5, A-Galileo, and standalone GPS, GPS L5, and GLONASS requirements
- CCSA standalone and assisted BeiDou requirements for the China-based market
- Operator-specific OTA testing
- Future standards-based OTA testing

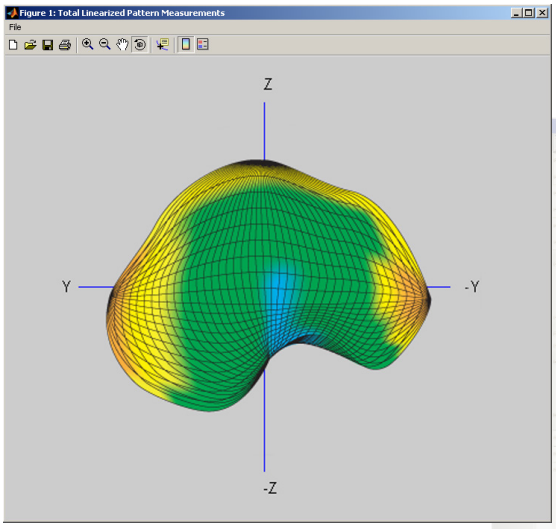
#### Device Manufacturers

- GNSS antenna characterization and performance benchmarking
- Impact of antenna placement and device form factor
- Degradation due to interference of A-GNSS and other radiation sources

With both standalone and assisted GNSS Over-the-Air (OTA) test solutions, Spirent brings its GNSS expertise and industry leadership to the OTA test environment. The OTA test pack option offers full automation of all GNSS OTA tests in the latest release of the *CTIA Test Plan for Wireless Device Over-the-Air Performance*, including A-GPS, A-GLONASS, A-GPS L5, A-Galileo, and standalone GPS, GPS L5, and GLONASS testing requirements. Spirent's GNSS OTA solution also supports China Communications Standards Association (CCSA) -defined A-BeiDou and standalone BeiDou OTA test requirements. Spirent is the only solution in the industry certified to test both CTIA and CCSA OTA GNSS requirements. Customizable parameters enable test time optimization, as well as testing beyond the requirements of these industry standards.

OTA test capability is supported on Spirent's Location Technology Solution (LTS) for GSM, UMTS, CDMA, LTE, and 5G NR devices. Due to its flexibility, the system can be configured to support testing of all devices in a single solution.

The Spirent LTS solution incorporates automation software from the leading suppliers of radiated test solutions: SATIMO's SMM and ETS-Lindgren's EMQuest™. As an option, custom chamber integration is available through Spirent professional services, whereby a customer-supplied chamber and associated hardware can be integrated with the Spirent GNSS OTA solution.

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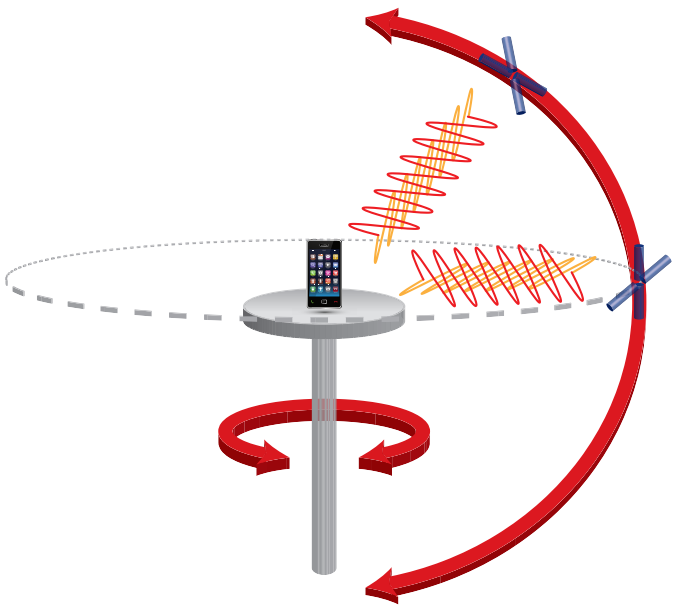
## Benefits

- **Comprehensive radiated GNSS antenna testing**—OTA testing measures the true radiated GNSS performance of mobile devices, unlike conducted testing where GNSS signals bypass the GNSS antenna and key RF components
- **Automated CTIA and CCSA standalone/A-GNSS OTA testing**—Full automation executes all the test procedures required by the CTIA and CCSA Test Plans with minimum user intervention
- **Flexible parameters maximize test efficiency**—Optimize test time by modifying parameters and scheduling only the tests that are needed
- **Testing capability beyond industry standards**—Extensive customization options enable advanced performance testing



*GPS antenna pattern testing at different angles of arrival and signal polarizations.*

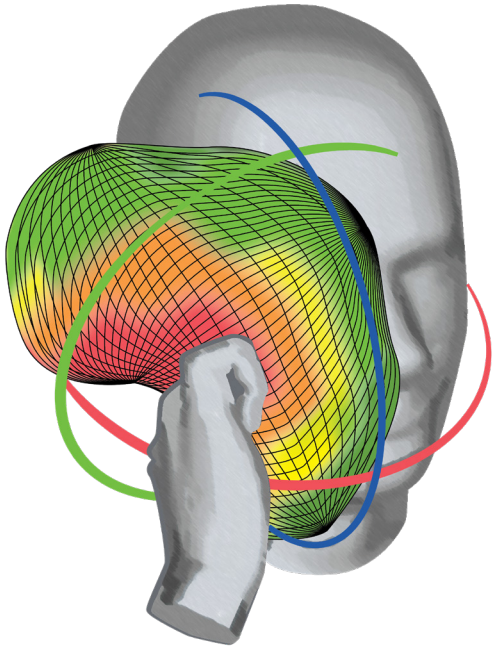
## Key Features

- Fully supports CTIA's standalone/A-GNSS OTA Test Plan v4.0 including new A-GPS L5, A-Galileo, and 5G NR requirements
- Supports OTA performance testing beyond CTIA Test Plan requirements, e.g., TIS calculation for A-GPS L5
- Uses standard cellular signaling channels for direct over-the-air measurements
- Conducts tests using standard positioning protocols as required by the specific cellular technology: LPP/SUPL for 5G NR; LPP for LTE; RRLP for GSM; RRC for WCDMA; and IS-801 for CDMA.
- Supports reliable operation with SUPL2.0 using RRLP and LPP protocol
- Supported by ETS-Lindgren's EMQuest™ automation software
- Supported by SATIMO's SMM automation software
- OTA Open API option for advanced customization and test case development
- Allows easy integration of Spirent's LTS for a combined GSM, CDMA, UMTS, LTE, and 5G NR GNSS OTA test solution
- Scalable to industry-leading coverage of conducted standalone/A-GNSS conformance and performance test capability for GSM, CDMA, UMTS, LTE, and 5G NR devices

## Technical Specifications

### Anechoic Chamber Requirements

- Anechoic chamber with turntable/positioning system, GNSS antenna, and cellular communication antenna
- Typical GNSS OTA path loss range: 30-80dB. Note: Max. 80dB OTA Loss supported
- Linearly polarized GNSS antenna, able to transmit two orthogonal polarizations supporting the frequency 1575.42 MHz for GPS L1, GLONASS, Galileo E1, BeiDou and 1176.45 MHz for GPS L5
- Minimum of one cellular antenna (two-antenna configuration also supported)
- Uplink Limiting Amplifier
- Turntable or other method of changing angle of arrival



*GNSS antenna pattern illustrating the impact of a human head and hand.*

## The CTIA Test Plan

Spirent's OTA test solutions automate the CTIA's OTA Test Plan for standalone/A-GNSS, which includes the following key steps:

- Establish the ***Antenna Pattern*** by radiating a reference GNSS Signal to the Device Under Test (DUT) and varying the angle of arrival in two planes using the chamber's positioning system
- Carry out a ***Linearization*** procedure to characterize and remove any non-linearities introduced by the DUT's measurements
- Measure ***Radiated Sensitivity*** by lowering the GPS signal until the DUT is unable to meet the performance requirements of the Test Plan
- Calculate Total ***Isotropic Sensitivity (TIS), Upper Hemispheric Isotropic Sensitivity (UHIS) and Partial Isotropic GNSS Sensitivity (PIGS)***, metrics which combine the Antenna Pattern and Radiated Sensitivity
- Test ***Intermediate Channel Degradation (ICD)*** to establish A-GNSS performance across a range of cellular channels likely to be encountered by the DUT while roaming

Spirent features support for the latest CTIA OTA test plan v4.0, which includes A-GNSS OTA TIS measurements over LTE and 5G NR using the LPP and SUPL 2.0 protocols.

**List of Spirent A-GNSS OTA solutions approved and placed on the CTIA Authorized Equipment List:**

- Spirent UMTS+GSM A-GNSS
- Spirent CDMA A-GPS
- Spirent standalone GPS/GLONASS
- ETS-Lindgren's EMQuest™ & Spirent UMTS+GSM+LTE A-GNSS
- ETS-Lindgren's EMQuest™ & Spirent CDMA A-GPS
- Satimo SMM & Spirent UMTS+LTE A-GNSS
- Satimo SMM & Spirent CDMA A-GNSS

### About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks.

We help bring clarity to increasingly complex technological and business challenges.

Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

For more information, visit: www.spirent.com

| System Requirements | |
|---|---|
| LTS | All OTA test options are available on the following LTS configurations: 8100-A500, 8100-B500, 8100-A600, 8100-A750, and 8100-B750 |
| PLTS | All OTA test options are available on the following PLTS configurations: C2K-CFG[6, 7, 8, 9, 12, 13, and 14]-SYS |
| LTS + PLTS | 5G NR, LTE, GSM, UMTS and CDMA devices can be tested on a single solution by upgrading any of the following PLTS configurations with: 8100-A750 (LTS) C2K-CFG[6, 7, 8, 9, 12, 13, and 14]-SYS |

**Spirent A-GNSS OTA Test Solutions**

| Solution \ Option | SATIMO SMM | ETS-Lindgren EMQuest™ | Spirent TestDrive-OTA Automation Software | OTA API for Custom Development |
|---|---|---|---|---|
| 8100-LTS (UMTS & LTE Devices) | ✓ | ✓ | ✓ | ✓ |
| PLTS (CDMA Devices) | ✓ | ✓ | ✓ | |
| Custom chamber integration* | | | ✓ | ✓ |

## Ordering Information

Due to the modularity and wide range of available 8100 Location Test Solution configurations, please contact your regional Spirent sales representative for detailed ordering information.

**Contact Us**

For more information, call your Spirent sales representative or visit us on the web at www.spirent.com/ContactSpirent.

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Rev L | 06/20