

# Synthetic Test Systems

## STI1000 Satellite Payload Test Instrument



STI1000 is a synthetic microwave test system configured for testing satellite payloads in factory environments.

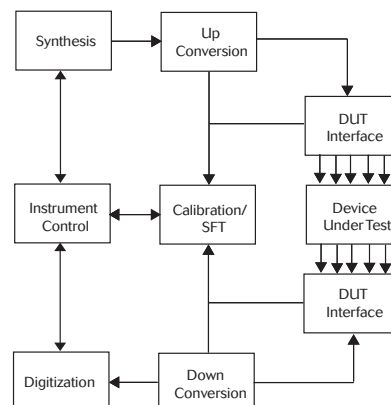
- 1 Million Samples per Second
- 20 Thousand Frequencies per Second
- Real-Time DSP Produces Results Fast
- Test Integration Reduces Data Requirements
- Calibration Plane Moved to the Payload
- Real-Time Calibration While Connected
- Imbedded Functional Tests
- Frequency Coverage of All Satellite Bands
- Synthetic Architecture
- "Programmable Firmware"
- WAN and LAN Support
- Multiple Satellite Interconnect Points
- Open-Architecture for Easy Upgrades
- Full Range of Communications Tests
- Analog or Digital Modulation Schemes

### Satellite Payload Test Instrument

The STI 1000 is a synthetic microwave test system optimized for testing satellite payloads in a factory setting. The STI 1000 can be used either as a stand-alone instrument or controlled by an external network as part of enterprise-wide factory automation. The STI 1000 is designed to dramatically improve integrated payload test times and reduce measurement errors introduced by either the operator or the test hardware. Through its digitally synthesized stimulus and response system design, the STI 1000 can easily be configured both in hardware and software to meet specific user requirements.

### HARDWARE

The STI 1000 hardware architecture is based on advanced synthetic instrument concepts. Through the use of this flexible design, the STI 1000 replaces and replicates several microwave test instruments including: a microwave power meter, a frequency counter, multiple sources, a spectrum analyzer, a vector network analyzer, a noise figure meter and an intermodulation analyzer. All of these instruments are represented by the STI 1000. A basic STI 1000 includes several stimu-



lus generators and a fast response measurement channel. Options can include the addition of arbitrary waveform generators for complex analog or digital modulation waveforms, telemetry and control paths and multiple response channels. An innovative calibration design allows for the calibration plane to be extended beyond the

instrument to the satellite connection point, even in a vacuum. The calibration design also allows for the system to be fully calibrated without disconnecting from the satellite. This calibration only takes seconds to perform and can be used to minimize system errors due to temperature variations.

Hardware paths are designed to support both high-speed, real-time calibration along with System Functional Test. Functional Test monitors the performance of the System and the remote calibration unit for proper performance. This minimizes false “fails” and provides a high level of confidence in the performance of the STI 1000 and quality of the data produced.

## FIRMWARE

The STI 1000 offers “programmable firmware” to allow for user optimization of the test instrument. Using the latest design concepts, the STI 1000 makes it easy to add tests and modify test algorithms. Additionally, simple structures such as data formats, test reports, user interfaces and graphical output may be customized. A standard instrument interface via TCP/IP (Ethernet) allows for control by any external computer platform and commercial test control software. A VXI Plug-n-Play driver is provided for integration into the user’s test control software. A multi-layered architecture insures that the data acquisition and processing is performed as fast as possible.

## TEST INTEGRATION

One of the keys to the STI 1000’s speed advantage is through “Test Integration”. This is the ability of the STI 1000 to collect a single data set that provides results for multiple test requirements. For example, the STI 1000 can extract results for in-band, out-of-band, group delay and amplifier transfer characteristics from a single data set. Using Test Integration along with the acquisition speed advantage of the STI 1000 greatly increases the data throughput of the instrument.

## MEASUREMENT SCRIPTING

The basic concept is that the STI1000 provides a functional measurement capability that is independent of traditional rack-and-stack-instrument functionality. The method for defining a measurement personality is through a downloaded script file. Any number of scripts may be loaded at any time and sequenced via a test executive or other external test controller. Thus, through a simple command, the STI 1000 may change from one measurement (i.e. vector network analyzer) to another (gain transfer tester). The STI 1000 is measurement driven not instrument driven.

Currently, Aeroflex can provide the following measurement personalities while others can easily be added:

- Gain Transfer
- In Band Frequency Response
- Passive Intermodulation
- Out of Band Frequency Response
- Group Delay
- System Level Phase Noise
- Noise Figure
- Telemetry Output Power

- Absolute Propagation Time
- Telemetry Frequency
- Telemetry Modulation Index
- AM/PM Conversion
- Command Sensitivity Lock/Unlock Threshold
- Command Receiver AGC Calibration
- EIRP and SFD
- Analyzer Sweep
- Gain Control
- Noise Power Ratio
- Amplitude Linearity
- Frequency Conversion
- Phase Non-Linearity
- Spurious Outputs
- Beacon Transmitter Output Power/EIRP
- Insertion Loss Calibration
- Beacon Transmitter Frequency
- Ranging
  - Automated Command Function
- T&C Omni Antenna Manual Patterns
- Gain Monitoring

## TYPICAL SYSTEM LEVEL SPECIFICATIONS

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*(Satellite Test Configuration)*

### Frequency Coverage

*0.200 – 32 GHz (Up to 110 GHz optional) Coherent  
1 or 2 Hz Resolution*

### Number of Ports

*32 Up Link / 32 Down Link (Up to 4 Remote Calibration Units)*

### STIMULUS POWER

#### Maximum Output

*-65 dBm (at RCU)  
0 dBm (at Rack)*

#### Range

*-5 to +53 dBm*

#### Settability

*+/- 0.25 dB*

### RESPONSE POWER MEASUREMENT

#### Range

*-5 to +53 dBm*

#### Dynamic Range

*75 dB Instantaneously*

**RSS Uncertainty**

+/- 0.25 dB – 0.2 to 18 GHz

+/-0.4 dB – 18 to 32 GHz

**NOISE POWER****Resolution**

0.1 dB

**RSS Uncertainty**

+/-0.25 dB 1-15 dBkTB

**FREQUENCY MEASUREMENT****Resolution**

0.1 dB Resolution 1 or 2 Hz

**RSS Uncertainty**

+/- 0.001 PPM

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