

Model SE-5310

Quad-Band RF Exciter & Test Signal Simulator

Satellite and Range Integrated Multi-Mission Solution

Applications

- Integrated Programmable Waveform Generator, Modulator, Noise Generator, Upconverter and BER Test System
- RF Link and Range Setup, Testing and Operation
- SatCom Science and Military Missions
- SGLS, USB, STDN Ground Stations
- Supports ARTM PCM/FM, SOQPSK, and Multi-h CPM
- Product and Flight Payload Integration, Simulation, Testing



Key Features

- Single or Dual-RF Output RF Exciter supporting Baseband, Lower & Upper L-Band, and Uplink/Downlink S-Band
- Multi-mode Digital or Complex Waveform Modulator for BPSK, QPSK, O/SQPSK, 8-PSK and 16-PSK to 50 Mbps and ARTM Range Tiers 0, I and II to 50 Mbps
- Integrated Solution Replaces Separate Noise Source, Upconverter, Amplifier, BERT and Hours of Calibration
- Internal Rate and Pattern Generator including Single Error Insertion for a truly stand-alone telemetry test source
- Programmable Frequency Sweep/Decay, Fade, Doppler
- Programmable Noise for Eb/No and SNR measurements
- Programmable Front Panel Ports for Setup and Monitoring
- I/Q Analog Outputs for External Vector Modulation
- Data Encoders with Convolutional Encoding, IRIG 106, PCMs Conversion, and Scrambling
- Software-Defined Radio with FPGA and DSP Architecture
- Compact 2U chassis without 3rd party Operating System or Hard Drive for increased reliability and security

The SE-5310 Quad-Band Satellite and Range RF Exciter & Test Signal Simulator combines a state-of-the-art high data rate digital wideband waveform modulator with a high performance radio frequency (RF) upconverter to produce transmission-ready signals in the Baseband, Upper L-, Lower L-, and both Uplink and Downlink S-Band frequency bands. An advanced, digital implementation provides for the small form and fit while fully satisfying applications requiring ruggedized packaging, minimum power consumption, and high spectral purity. The design supports a multitude of complex digital formats for Satellite and ARTM Range use.

Data generation, coding, and modulation can be driven from a variety of external digital inputs or via internal pattern and waveform generation sources.

The practical design of the SE-5310 Exciter also supports link test and verification applications. A single SE-5310 can replace a BERT, waveform generator, vector modulator, upconverter, amplifier, noise source, attenuators, power meter, spectrum analyzer and a frequency converter. Combining these capabilities in one small, simple-to-use unit allows quick and accurate setup and testing without in-depth system knowledge.

An optional second, independently tunable modulated RF output may be used effectively with dual-polarized systems. Output power levels are adjustable from +10 dBm to -80 dBm in 0.1 dB steps for fine control and fade profiling.

Configurable front panel connectors provide operators with ready access to internal signals. The SE-5310 can optionally support a station clock for external frequency reference.

The SE-5310 includes support for user-configurable Doppler simulation and satellite acquisition automation functions. Additionally, up to 32 Configuration Profiles can be stored with user-defined link names and recalled with a single command, simplifying fast and accurate configuration changes.

The firmware-intensive implementation of the SE-5310 readily accommodates custom features and signal processing tasks. Using the latest generation digital signal processing techniques allows upgrades via firmware changes, even for previously fielded systems.

The SE-5310 is not based on a PC platform, avoiding the requirement for 3rd Party Operating Systems and hard drives and reducing the need for system patches and IT security concerns.

The SE-5310 RF Exciter is implemented in an industry standard 19 inch rack mountable chassis and provides full status and control capabilities. Controllable selections are accessible via a front-panel display or remotely via a standard RS-232 serial and 10/100baseT Ethernet or optional GPIB interface.

Model SE-5310 Satellite/Range RF Exciter System Specifications

Firmware Personalities & Supported Waveforms

Analog/Digital Satcom Personality includes Main and/or SubCarrier:
Phase Modulation (PM) - Digital or Analog (10 Hz to 25 MHz)
Frequency Modulation (FM) - Digital or Analog (50 Hz to 5 MHz)
Phase Shift Keyed (PSK)
BPSK (50 bps to 10 Mbps)
QPSK, OQPSK (100 bps to 20 Mbps)
U/AQPSK (100 bps to 2.5 Mbps low, 5 kbps to 10 Mbps high)
PM/PSK - Configurable subcarrier frequency
Single or Dual Viterbi Encoder
High Rate / Range Personality includes Main Carrier:
Phase Shift Keyed (PSK)
BPSK (1 kbps to 25 Mbps)
QPSK, OQPSK (1 kbps to 50 Mbps)
ARTM Tier 0 (to 15 Mbps), 1, and 2 (to 50 Mbps)
Other Modes or Combinations On Request

Data Inputs

2 TTL Data/Clocks: 50 bps to 20 Mbps
2 LVDS Data/Clocks: 50 bps to 50 Mbps
Internal Digital Pattern Generator
Internal Clock Generator (With Output)

Primary RF Output

Frequency: 1400-2600 MHz Continuously Tunable
Frequency Resolution: 10 Hz
Output Level: +10 to -80 dBm or OFF
Step Size: 0.1 dB
Modulation Options: Unmodulated CW, Digital Modulation
Spurious: >-60 dBc to 1 MHz (typical)
>-70 dBc >1 MHz
Phase Noise: <-85 dBHz at 10 KHz offset
Programmable Sweep and Frequency Decay:
Sweep Range: Up to ± 20 MHz
Sweep/Decay Rate: 10 Hz to 1 MHz/sec.
Sweep Control: Up, Down, Bi-Directional

Secondary RF Output (Optional)

Frequency: 1400-2600 MHz Continuously Tunable
Characteristics: Identical to Primary RF Specifications
Modulation Options: Unmodulated CW
Modulated with Primary RF Waveform
Output Level: +10 to -80 dBm or OFF
Step Size: 1 dB

AM or ASK Waveform Specifications

Digital Mode: Binary ASK or OOK
Analog Modes: External In, Digital Modulator In
Modulation Rates: 100sps to 10Msps or Up to 10MHz Analog
Mod Index: 0.1 to 100% in .1% increments

FM or FSK Waveform Specifications

Digital Mode: Binary FSK
Analog Modes: External In, Digital Modulator In
Modulation Rates: 100sps to 20Mbps or Up to 20MHz Analog
Deviation: 200Hz to 20MHz

PM or PSK Waveform Specifications

Digital Modes: BPSK, QPSK, AQPSK, UQPSK, OQPSK, or DPM
Analog Modes: External In, Digital Modulator In
Shaping: Phase Transition over 0 to 100% of Baud Period
Modulation Rates: 50sps to 50Msps or Up to 20MHz Analog
Mod Indices: 0 to 180 degrees for DPM, Adjustable I/Q power ratios for A or UQPSK

ARTM Waveform Specifications

Modulation Types:
ARTM Tier 0 (PCM/FM) to 25 M bit/s
ARTM Tier I (SOQPSK) to 50 M bit/s, 25 M baud/s
ARTM Tier II (Multi-h CPM) to 50 M bit/s, 25 M baud/s
Modulation Characteristics:
Premodulation Filtering per IRIG 106

Coding Formats

PCM: NRZ - Mark (NRZ-M), Space (NRZ-S), Level (NRZ-L)
BIØ - Mark (BIØ-M), Space (BIØ-S), Level (BIØ-L)
Convolutional: Bypass, Rate 1/2, or Rate 3/4 (Punctured)
Constraint Length 7, Industry Standard Polynomials
G1/G2, G1/-G2, G2/G1, -G2/G1 Symbol Ordering
Scrambling:
Bypass, Intelsat (V.36), or CCITT (V.35), RCC 106 15-bit IRIG

Additional Features

Bit-Error-Rate Testing: Monitors Bit Error Rate for Returned Data of Internally Generated Data Patterns
AWGN Noise Generator: Adds Simulated AWGN to Output Waveform to Establish Accurate Eb/No Levels
PN Code Generators for Industry Standard Patterns
Bit-Synchronizer: Auto-baud detect to adapt shaped waveform and/or Modulation Indices
Up to 32 Stored Configuration Profiles

Remote Status/Control Specifications

Serial RS-232, 10/100baseT (GPIO Optional)
Commands: Control Over All Configurable Parameters
Status: Lock, Self-Test, Detailed Operational Information

Other Specifications

Chassis: 19" Rack Mount, 3.5" H (2U), 22" D (Excl. Connectors)
Connectors

- 1 Type N for Primary RF Output
- 1 Type N for Secondary RF Output (Option)
- 2 BNCs for Monitor Ports (Front Panel)
- 8 BNCs For Data/Clock Inputs/Outputs
- 1 25 PIN D for Differential Data/Clock Inputs/Outputs
- 1 BNC for External Reference Input (Option)
- 1 BNC for Internal Reference Output (Option)
- 2 BNC Analog In/Out
- 1 9 PIN D for Remote Status/Control
- RJ-45 for 10/100baseT
- GPIO (Option, replaces 10/100baseT)
- Standard 3 Prong Male Primary Power Input

Primary Power: 120 VAC (+/- 10%) 50-60 Hz

Temperature: -25° TO 60° C Operational, -45° TO +65° C Storage

* All specifications subject to change without notice or obligation to retrofit.
Consult factory for custom options and/or alternate specifications