Model SE-5315

8 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, & Multiple L-, S-, and C- or P-Band Frequencies
- 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-5315 8 Band Satellite and Range RF Exciter & Test Signal Simulator combines a high data rate digital wideband waveform modulator with a high performance RF upconverter to produce transmission-ready signals in Baseband, Lower L-, Upper L-, ARTM Range S-, Low C- (4 GHZ) and Extended Mid C- (5 GHz), and Satellite Up and Downlink S-Band frequency ranges. For sites using downconverted CIF receivers, Low P (460 MHz) and Mid P (1150 MHZ) can be supplied. An advanced digital system provides a small form and fit while 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-5315 Exciter also supports link test and verification applications. A single SE-5315 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 manually or programmably adjustable from +10 dBm to -80 dBm in 0.1 dB steps for fine control and flight simulation. During programmed fades the output levels can be set for a 0°, 180°, or independent phase relationship.

Configurable front panel connectors provide operators with ready access to internal signals. The SE-5315 can optionally support a station clock for external frequency reference.

The SE-5315 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-5315 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-5315 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-5315 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.

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Model SE-5315 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 (256 kbps to 25 Mbps)
  - QPSK, OQPSK (512 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
4400-5250 MHz (Optional)
400-1150 MHz (Optional)
Frequency Resolution: 10 Hz
Output Level: +10 to -80 dBm or OFF, +15 dBm Optional
Programmable Fade: 1 Hz to 10 kHz, 0.0 to -20.0 dB
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, Satellite Acquire

Secondary RF Output (Optional)

Frequency: 1400-2600 MHz
4400-5250 MHz (Optional)
400-1150 MHz (Optional)
Characteristics: Identical to Primary RF Specifications
Modulation Options: Unmodulated CW
Modulated with Primary RF Waveform
Output Level: +10 to -80 dBm or OFF, +20 dBm Optional
Programmable Fade: 1 Hz to 10 kHz, 0.0 to -10.0 dB, 0°/180°/Indep.
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 Indicies
Up to 32 Stored Configuration Profiles

Remote Status/Control Specifications

Serial RS-232, 10/100baseT (GPIB 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
- GPIB (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

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