

# Model RM-6300

## 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, CPM and common SatCom and Test modulations
- Product and Flight Payload Integration, Simulation, Testing



#### Key Features

- Single or Dual RF Output RF Exciter supporting Baseband, & Multiple C/F-, 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
- Intuitive, touch panel display
- Six (6) internal Rate and Pattern Generators 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

The RM-6300 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 C/F receivers, Low P (300 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 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 RM-6300 Exciter also supports link test and verification applications. A single RM-6300 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 0 dBm to -110 dBm in 0.1 dB steps for fine control and flight simulation. Fade profiles can be set for a 0°, 180°, or independent phase relationship.

Configurable front panel connectors provide operators with ready access to internal signals. The RM-6300 can optionally support a station clock for external frequency reference.

The RM-6300 includes support for user-configurable Doppler simulation and satellite acquisition automation functions. Additionally, Configuration Profiles can be stored with user-defined link names and recalled with a single command, simplifying fast and accurate configuration changes.

The RM-6300 provides a suite of Receive and Combiner performance tests including multiple, simultaneous Bit Error Rate tests, Noise Performance based on Eb/No or System noise floor, Combiner Break Frequency, Receiver Noise Figure, ACI, Data Latency, Multipath, and power, frequency, and bit rate stress.

The firmware-intensive implementation of the RM-6300 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 RM-6300 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 10/100baseT Ethernet interface.

# Model RM-6300 RF Telemetry Signal Simulator Specifications

## Supported Waveforms

ARTM Tier 0 (PCM/FM) (1 Mbps to 25 Mbps)  
ARTM Tier I (SOQPSK) (1 Mbps to 50 Mbps)  
ARTM Tier II (ARTM CPM) (5 Mbps to 25 Mbps)  
ARTM SOQPSK/LDPC  
ARTM STC/LDPC  
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 (250 bps to 25 Mbps)  
    QPSK, OQPSK (500 bps to 50 Mbps)  
    U/AQPSK (250 bps to 25 Mbps, adjustable I/Q power ratio)  
PM/PSK - Configurable subcarrier frequency  
Digital PM: Mod Index 0 to 180 degrees  
Analog Modes: External In, Digital Modulator In  
NTSC Video: Analog input or test patterns, selectable Pre-Emphasis

## Data Inputs and Outputs

12 TTL Data/Clocks: 50 bps to 20 Mbps  
12 LVDS Data/Clocks: 50 bps to 50 Mbps  
6 Internal Digital Pattern Generators  
6 Internal Clock Generator (With Output)  
Data/Clock Phase: Independently adjustable 0 to 180° in 1° steps  
Impedence: 75 Ω, 50 Ω BNC Connector, Factory option 50 Ω

## Primary / Secondary RF Output

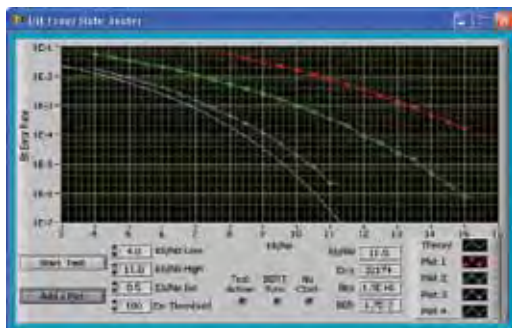
Frequency: 1400-2600 MHz  
    4400-5250 MHz (Optional)  
    200-1150 MHz (Optional)  
Frequency Resolution: 1 Hz  
Output Level: 0 to -120 dBm or OFF, Higher Power Optional  
Programmable Fade: 1 Hz to 75 kHz, 0.0 to -30.0 dB  
Step Size: 0.1 dB  
Modulation Options: Unmodulated CW, Digital Modulation  
Spurious: >36 dBc per IIRIG 106-11 (In-Band)  
    <60 dBc per IIRIG 106-17 (Out-of-Band)  
Phase Noise: Per IIRIG 106-15 2.4.3.6, CPM Limit  
Programmable Sweep and Frequency Decay:  
    Sweep Range: Up to ±100 MHz at 10 Hz/s  
    Sweep/Decay Rate: 10 Hz to 1 MHz/sec.  
Sweep Control: Up, Down, Bi-Directional, Satellite Acquire  
Spectral Inversion: Auto or manual Inversion 300-1150 MHz

## IRIG-B Input

Type: DCLS Unmodulated or Modulated AM (Option)

## Display and Test Results

Graphical  
.csv file format



## 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  
LDPC: IIRIG 106-15 Appendix R and NASA common codes (Option)  
STC: IIRIG 106-15 Appendix S Standard with pilot bits (Option)  
Scrambling:  
    Bypass, Intelsat (V.36), or CCITT (V.35), RCC 106 15-bit IIRIG

## Additional Features

Bit-Error-Rate Testing: 6 Independent Bit Error Rate Monitors  
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  
Optional Tests:  
    Combiner Break Frequency  
    PCM/FM Modulation Index  
    Adjacent Channel Interference  
    Power, Frequency, and Bit Rate Stress Sweep  
    Receiver Filter Stress Sweep  
    Data Latency  
    Multi-Ray Multipath Simulation  
    AM Sinusoidal Overlay (Antenna Error Signal Simulation)  
Up to 32 Stored Configuration Profiles

## Remote Status/Control Specifications

10/100baseT  
Commands: Control Over All Configurable Parameters  
Status: Lock, Self-Test, Detailed Operational Information  
Web browser GUI

## 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)  
    4 BNCs for Monitor Ports (Front Panel)  
    12 BNCs For Data/Clock Inputs/Outputs  
    1 44 PIN D for Differential Data/Clock Inputs/Output  
    1 BNC for IRIG-B Input  
    1 BNC for External Reference Input  
    1 BNC for Internal Reference Output  
    2 BNC Analog In/Out  
    2 RJ-45 for 10/100baseT  
    Standard 3 Prong Male Primary Power Input  
Primary Power: 120 VAC (+/- 10%) 50-60 Hz  
Temperature: -10° TO 50° 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  
Some features and functions are optional